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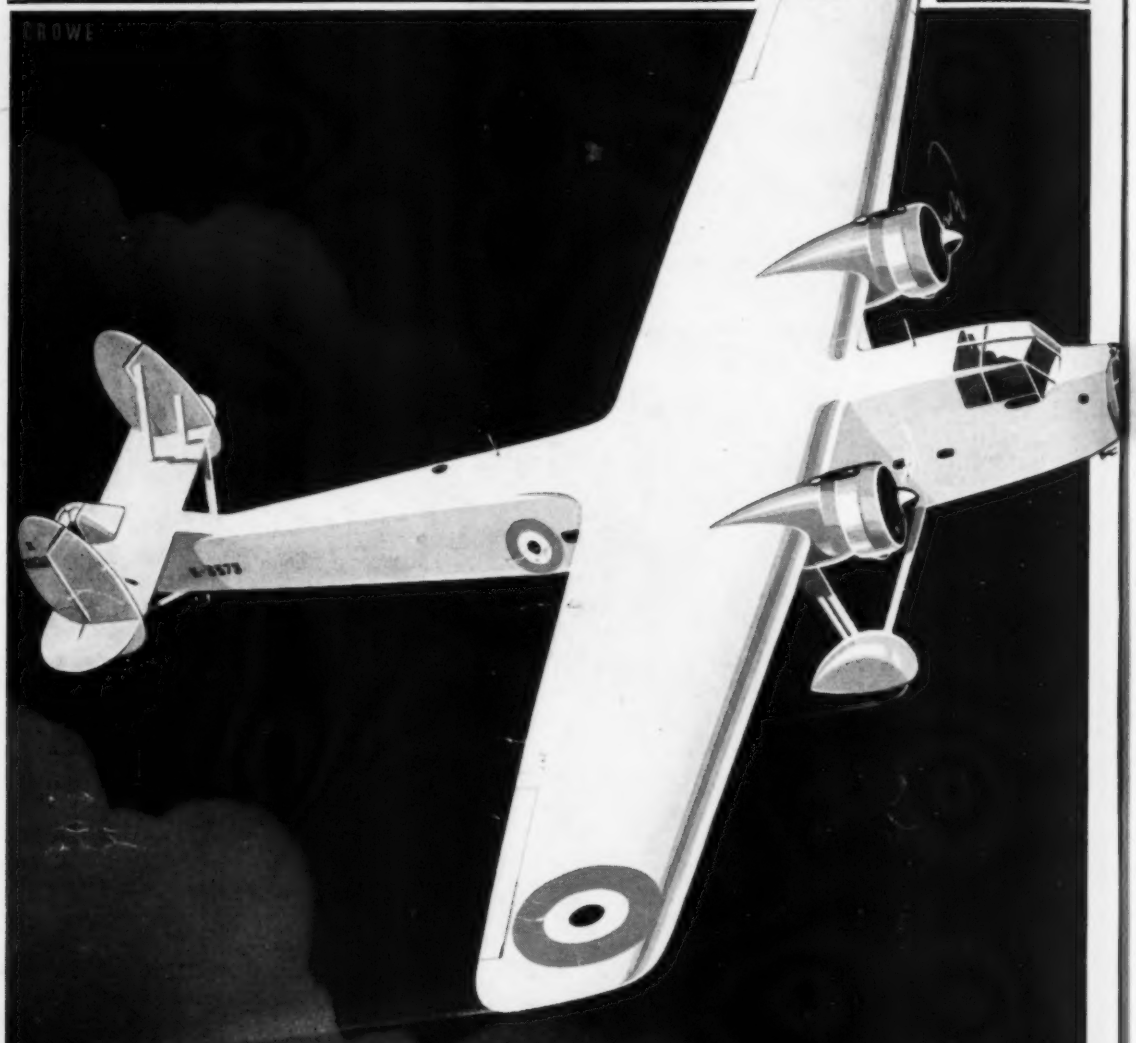

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

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The Outlook

Missing the Seventh

THE summer of 1938 promises to be rather a dull one from the point of view of what one may term spectacular aviation. The R.A.F. Display at Hendon has been abandoned, a decision on the part of the Air Council which is perfectly natural in the circumstances, no matter how much one may regret the disappearance of the year's greatest flying spectacle.

Empire Air Day was to take the place, in some measure, of the Hendon Display, but the weather last Saturday was extremely unkind, and chose that day of all days for breaking the fine-weather spell lasting several months, thereby causing programmes to be curtailed and amended, if not actually cancelled.

And now comes the following announcement from the Society of British Aircraft Constructors:—

"The S.B.A.C. regret that the Society's Flying Display and Exhibition, which was organised for the first time in 1932 and has since taken place annually, will not be held this year. The reasons for this decision, reached by the Council of the Society after careful consideration of all the factors involved, are that it is not in the public interest to show the latest types of military aircraft and engines, and that the immense amount of work devolving upon the British aircraft industry at the present time makes undesirable the diversion of time and energy to organisation of a Display."

This decision, although extremely regrettable from many points of view, is understandable. From a knowledge of the types of new aircraft which are being built in the different works, one may safely assume that the Air Ministry would permit no single machine which has not been seen at previous S.B.A.C. Displays to be demonstrated and inspected at any show held this year. That being so, obviously a display of old and familiar types would give a totally erroneous impression to the many hundreds of foreign visitors who would have flocked to the S.B.A.C. Display.

On rather a different footing is the so-called "Static" Display of the S.B.A.C. That section was, in the past, not merely of interest to foreign visitors, but formed a very useful meeting ground for associate members of the Society. It would be a good idea to hold a static exhibition in some convenient hall in London, where members could meet and inspect one another's products. It is to be hoped that such an exhibition will be staged at a later date.

A Really Useful Step

ONE very good innovation can be recorded which ought to check the great multiplicity of modifications and consequent delay in the output of aircraft, to say nothing of solving the maintenance troubles of squadrons. Senior officers of the R.A.F., Wing Commanders no less, are being appointed liaison officers at the works of the contracting firms. Hitherto there has been no direct touch between the producer and the user of Service aircraft. When the squadrons found something inconvenient in a new type they had to report to one department of the Air Ministry, which passed it on to another department, and sometimes the report never reached the manufacturer in time to do any good. We can recall one definite case of a new type served out to a squadron overseas, which found certain maintenance difficulties, and reported on them. Yet the manufacturer never heard of the shortcomings until an officer from the squadron came home and went to the firm and (this may have been insubordination, so we shall mention no names) told the firm the whole story, thereby evoking great gratitude from the said firm. Under this new and admirable system a whole lot of red tape ought (to mix the metaphor) to be short-circuited.

Already the Air Ministry (we rather fancy Lord Weir had a hand in it) has taken steps to promote co-operation between designers and production managers in the firms, and this further liaison with the squadrons ought to have the happiest results.

Castles (Bromwich) in the Air

LAST week *Flight* welcomed the announcement that Lord Nuffield had made up his quarrel with the Air Ministry and that his great organisations were to be drawn into the aircraft-production circle. We also suggested that it might be a good plan if, while the new factory at Castle Bromwich was being built, Lord Nuffield's production engineers could be in close consultation with the designers of an aeroplane while constructional details were being planned, a system which it was not possible to introduce when the shadow factory scheme was initiated.

That production could be accelerated in this manner we have not the slightest doubt, but it is rather a far cry from that to the "5,000 planes a year" announced the other day by one enthusiastic daily. Lord Nuffield cannot produce aeroplanes out of his hat any more than can any other aircraft organisation, and announcements of this nature do a disservice to a man who will, without doubt in time, make an extremely valuable contribution to the country's aircraft production.

Fantastic speculations of this sort do a lot of harm. One need only recall the stories which gained currency some years ago when Lord Nuffield started aero engine development. The Morris aero engine, it was said, was to weigh no more than one pound per horse-power, and would cost £1 per horse-power. When the engine appeared its weight was comparable with that of other aero engines, and the cost was certainly not startlingly below the average. It should be realised that Lord Nuffield never made these claims himself; they were wished upon him by doubtless well-meaning but ill-advised enthusiasts. And so again now with the new factory and its alleged production capacity.

Fortunately for the country something a good deal less ambitious will meet the requirements, and even 500 aeroplanes a year from Lord Nuffield's Castle Bromwich factory would be a welcome addition to the country's output of aircraft.

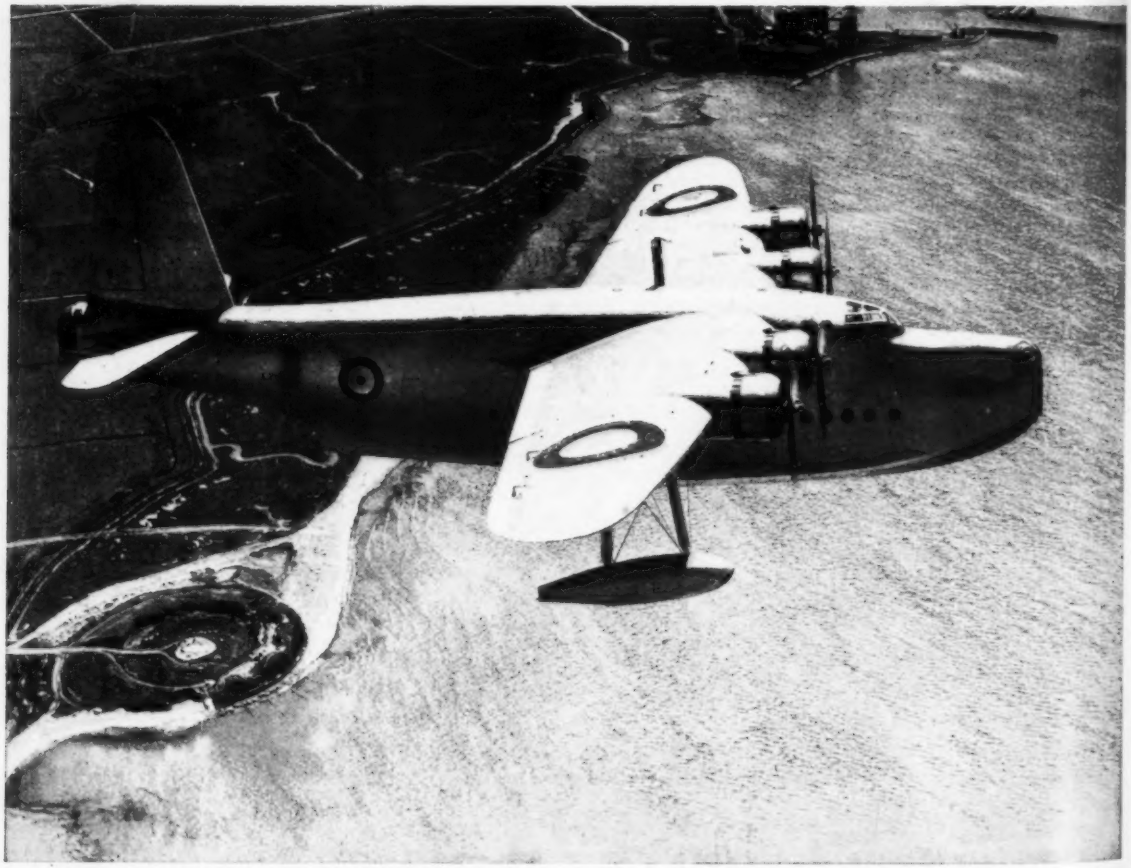
Stocktaking

THE 1938 Wilbur Wright Memorial Lecture will, without a doubt, go down to history as one of the most notable of the series. Never before, curiously enough, had a Wilbur Wright lecturer chosen as his subject the materials used in building aeroplanes and engines, and it may well be that never again will there be an opportunity like the present. Progress during the last few years has been amazing, and, although certain new materials and processes are beginning to appear on the horizon, it seems unlikely that the present rate of progress can be maintained. Consequently, Professor Gough had chosen a most opportune moment for his subject, and, in spite of modest disclaimers, he made the most of his opportunities.

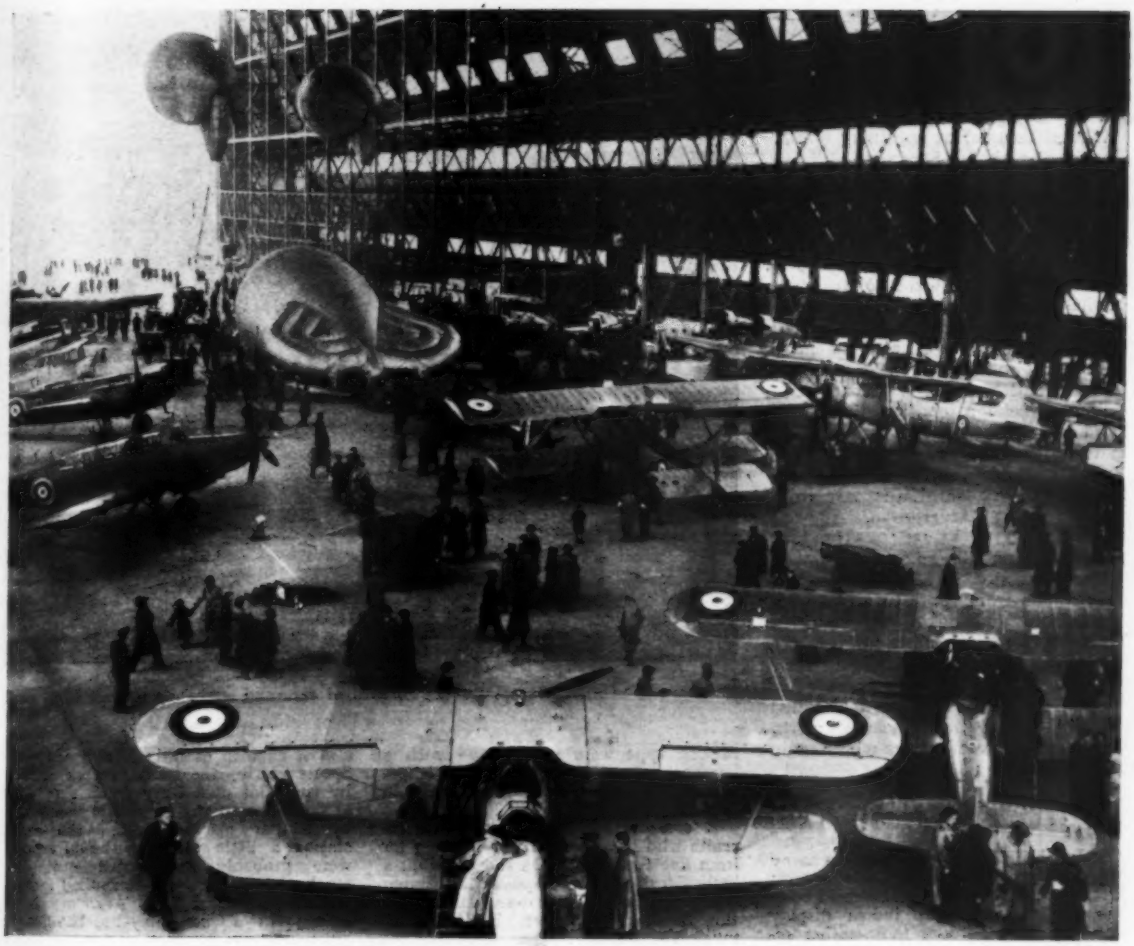
"Materials of Aircraft Construction" is an invaluable fund of information for the engineer and the student, and we should have liked to publish the paper in full. Unfortunately, it would have occupied something like two issues of *Flight* if they contained nothing but the paper, and we have had to be content with publishing a summary, the first part of which appears this week.

Apart from the review of materials in use at the present time, Professor Gough's paper throws some valuable light on what we may expect in the not-too-distant future in the way of new materials, notably from plastics and compressed and impregnated wood. Probably the "exhibit" which attracted the greatest attention was the De Havilland hollow airscrew made of Bakelite with cord reinforcement. The run of the cords right out into the flange which holds the blade root in the metal hub should ensure great strength, and may be compared, as the lecturer pointed out, to the grain flow in metal forgings. The question of creep is still important, but can probably be taken care of more easily in an airscrew blade root than in most other components which might be made of this material.

Another outstanding point made by the lecturer referred to the extensive use now being made of extruded light-metal sections. Much the same observations were made by *Flight* in a leading article some months ago. When, shortly, we publish a description of the Westland Lysander, many interesting uses of extrusions will be disclosed.



AT THE M.A.E.E. : A Short Sunderland long-distance flying boat (four Pegasus) on test near the Marine Aircraft Experimental Establishment, Felixstowe. Some notes on this formidable machine appear on page 554.



Lighter-and-heavier-than-air Day in the big hangar at Cardington. In this non-stop variety picture are barrage balloons, a Blenheim and a Battle (left), a new Hind Trainer (foreground), Hector, Shark, Swordfish and Cloud (right), not to mention other less discernible aircraft and a goodly proportion of the population of Bedfordshire.

EMPIRE AIR DAY

The Royal Air Force, Assisted by Civil Aerodrome Owners, Holds Its Nation-wide "At Home"

THE Royal Air Display at Hendon may have been the star and Empire Air Day the understudy; but when the younger event stepped up last Saturday into the limelight vacated by the departed elder there was nothing uncertain about the warmth of the public ovation.

Let the truth be told: the Hendon Display, however firmly entrenched as a social fixture, left certain aspects unsatisfied where the general public was concerned. For one thing, there was always that slightly superior and official remoteness of the display, the aeroplanes, and the performers. No amount of broadcasting or air-to-ground telephony could bridge that implacable chestnut paling which barred the way to closer acquaintance with the wonders of the sky.

And particularly was that true in respect of the younger generation. So far as John Willie is concerned, let him but rub his nose in the oil on a Lewis gun and you can keep your squadron air-drills, interception exercise and aerial refuellings.

There lies the chief appeal of Empire Air Day, and the reason that it has blossomed so fruitfully since its inception by the Air League five years ago.

Once cajoled to an aerodrome, young and old alike become consumed by a raging curiosity to see, touch, sniff and scramble upon aeroplanes at close quarters—especially military aeroplanes. And there is always that flattering feeling that "We're being let into secrets."

All this constituted one of the chief reasons why last Saturday's rain did not have any appreciable effect at the eighty-eight aerodromes—mainly R.A.F.—that opened their gates to the public in return for a modest contribution to Service charities. What matter if a few of the flying events here and there were washed out? If some of the promised formations curtailed their tours? Sons could sit in fighter cockpits, kings for a day. Fathers could ask questions intended to prove that they really knew what their income-tax was buying. Mothers could see the domestic side of Service life. So everybody was happy.

One particularly pleasing aspect, as compared with last year's Empire Air Day, was the absence of accidents. In spite of poor visibility and bumpy air, only two mishaps were reported, both of negligible importance.

Like a benevolent presiding spirit, Sir Kingsley Wood, Secretary of State for Air, flitted from aerodrome to aerodrome in the Air Council's D.H. 86B, visiting six—Hendon, Halton, Odiham, Farnborough, Kenley and Biggin Hill—accompanied by Air Chief Marshal Sir Cyril Newall, Chief of the Air Staff. The Under-Secretary, Capt. Harold Balfour, toured between a number of stations in a Nighthawk of No. 24 (Communications) Squadron.

Some official attendance figures to hand as we go to press bear witness to the success of the day:—

Castle Bromwich, 19,540; South Cerney and Woodsford, approximately 15,000 each; Aldergrove, 12,020; Hullavington, 11,250; Hendon, 11,216; Biggin Hill, 10,079.

Hereafter are some glimpses and impressions from representative aerodromes up and down the country. Those who want a close insight into the duties demonstrated should refer to last week's special number of *Flight*, in which appeared detailed descriptions of the rehearsal work, written by representatives who flew in the machines.

Except for the absence of cars and flags, the picture from Northol[t] the depart[ure]

CARDINGTON

CARDINGTON was luckier than many of the other stations for two reasons: first, because their hangar is almost large enough for a complete indoor display and, secondly, because the weather relented from time to time to allow some balloons to go up and one to be shot down.

An R.A.F. balloon training unit was first formed at Cardington in December, 1936, with a personnel of about fifty. Then the defence of London Balloon Barrage Scheme was introduced and a special Training Unit for this purpose was formed on January 30, 1937. No. 2 R.A.F. Depot was transferred from Henlow to Cardington in September, 1937, and some 2,000 recruits are at present under training, while a new wing is being constructed for another 1,000 recruits. There is also a school for machine-tool setters and operators.

A large number of representative machines were to be seen both inside and outside the big hangar, including Harrows, a Whitley, Battle, Blenheim and Hind Trainer. Memories of the old R.100 and 101 were recalled by a display which included a control cabin, specimen girders and a well-preserved engine gondola.

Balloons, specimen fabric, instruments and winches were shown, and of special interest was a complete mobile balloon unit, comprising winch, ropes, folded envelope and all the necessary gear, with a trailer behind carrying the gas cylinders.

Every balloon (a modified form of war-time kite balloon now known as the L.Z type) has its own separate mobile winch specially made by the Fordson Company.

The flying display went off almost to schedule, and events of tactical and routine type were interspersed with a height-judging and speed-judging competition and aerobatics in modern and old machines.

A considerable company of new recruits who have been under training for from five to seven weeks showed what a little Service life and physical training can do for one. They were assisted by the Cardington Station Band, whose musical efforts were enhanced during the afternoon by the acoustic properties of the airship hangar.

CALSHOT

IN spite of the fact that there is, to experienced eyes, little that is really new at Calshot, a very representative show was put on last Saturday with the assistance of other stations. From the point of view of the general public, seaplanes are, in any case, of particular interest, as such machines can very rarely be seen at close quarters. In the sea, the air and the hangars (where all and sundry were permitted to do practically as they pleased) there were Supermarine Scapas and Walrus, Saro Londons and Clouds and Fairey Swordfish. The Londons are flown by No. 201 Squadron, which is stationed at Calshot, while the other machines are used for training by No. (240 G.R.) Squadron. Unfortunately, the fact that low water coincided with the middle of the programme prevented the machines from being taxied and hauled up and down the slipways during the whole of the afternoon, but spectators were able to see how the beaching business was carried out before and after this low tide.

Undoubtedly the most attractive item on the programme was that in which a Swordfish from Gosport dropped a dummy torpedo just off the spit after a good deal of necessarily low-speed manœuvring between the masts of the crowded shipping. The torpedo had no motive power in action and its brilliant red nose bobbed again ort of the water almost as soon as it had been dropped. Spectacularly, the individual aerobatics by the pilot of a Fury from Tangmere and the very tight formation aerobatics by similar machines from the same station a little later in the afternoon were probably appreciated quite as much, though the radio-controlled formation flying by six Avro Ansons was of an expertness which may not have been given due credit.

The water in the Solent was in the wind-against-tide condition, which can cause so much discomfort to the crews of comparatively small flying boats, and the Clouds, in particular, were almost invariably bounced off before flying speed had been gained, though the Swordfish appeared to find little difficulty. The value of amphibians like the Cloud and the Walrus must be very much appreciated where school flying demands constant hauling up and launching. These machines simply dropped their undercarriages and were immediately pulled up by means of a winch, whereas the Swordfish had to have beaching trollies placed in position and removed again between each flight. Needless to say, the Scapas, when they were not flying, remained moored in Southampton Water.

For those who are interested in the technicalities concerned with Service flying there was a particularly good display of machines, guns, photographic equipment and marine craft in the different hangars, while one of the new high-speed Power Boats was on view at the jetty. These boats have a cruising speed of 30 knots in the open sea and are used as navigation and rescue auxiliaries during exercises. One of the armoured bombing-target boats was also to be seen—but on dry land in this case.

NORTH COATES

FOR North Coates, Lincs, the occasion was something of a special one, as this year the station attains its

"*Flight*" *photograph.*

...he departed Hendon Display.

majority as a flying ground, an aeroplane having first landed there in 1917. It so happens that at the moment there is an officer serving at North Coates who was one of the original users of the war-time aerodrome.

Saturday's display, both in the air and on the ground, accented the duties of North Coates as an armament training station. Here, as at other places on the East Coast, the weather had a rather more marked effect on the programme.

The cloud base was at about 500ft. and intermittent rain fell. The cloud did rise for a quarter of an hour towards the end of the afternoon and enabled aerobatics by a Gladiator to be demonstrated. The air drill items were modified and only three aircraft took part in each case, while the fly-past was abandoned—heavy rain was falling at the time—to become, however, a "taxy-past" or "Concours d'Elégance." The remainder of the programme was, nevertheless, carried out completely and strictly to schedule in spite of the very trying conditions.

The number of spectators was just over 4,000, compared with 6,900 last year, when the display was held in brilliant sunshine. This year, too, there was a counter attraction: a large Conservative rally was being held ten miles away. Sir John Simon was attending and proved a great draw in this staunch Tory part of the country.

Considerable amusement was given to the Service personnel when a member of the public asked the Demon demonstrating R/T. at about 200ft. to fly the length of the aerodrome in an inverted position. The pilot declined—in a polite but very definite way.

ALDERGROVE

SEVERAL young officers, on arriving recently at Aldergrove, asked the Station Accountant Officer the amount of Colonial allowance payable to personnel serving in Northern Ireland. Therefore one may be forgiven for saying that Aldergrove was very much part of the British Isles on Saturday, May 28, 1938.

The programme was one that appealed to the public, whose appetite for the events had been sharpened by splendid prior publicity.

Formation flying by Nos. 23, 25 and 502 (Ulster) Squadrons was voted (by someone who should know) to equal anything seen at Hendon.

Supply dropping by members of 502, aerobatics by the Station Flight, and attacks on towed targets greatly interested the spectators.

"Colonel Bogey" made a spectacular jump from a Westland Wallace, proving conclusively that a "sand man" armed with only a golf umbrella may float through the air with the greatest of ease. It mattered not if his take-off consisted of a hefty push through the floor of the Wallace; after a shaky start he landed gracefully to the accompaniment of cheers from the crowd.

Aldergrove, being in Ireland, took its toll from "the gintleman that pays the rint." An inflated pig, judged by the R.A.F. Pigs Board as being qualified for re-mustering as Pork, A.1, took the air, but after coming within range of a shotgun passed out.

An attack on a brigand fort by the combined aircraft was most successful. Several direct hits must have been registered, for, in the end, and however clever the defenders may have been, the place went up in smoke and flames.

An imposing array of aircraft, ranging from Avro Tutors to Saro London flying boats, took part in a fly-past.

One event ordinarily outside a flying programme was a demonstration by the Air Raid Precautions officials of the Home Office, Northern Ireland, in conjunction with members of the Belfast Branch of the St. John Ambulance Society. It was a most realistic performance.

In contrast to conditions on this side, the weather was glorious. Between thirteen and fourteen thousand spectators thronged the hangars and other sections on view. Both before and after the official programme two civil aviation firms did good business in giving joy flights at popular prices.

MANSTON

IT was Anson Day at Manston. True, the Hinds of the County of Kent Squadron put paid to three of them in the setpiece, and performed drill, aerobatics and low-flying attacks in regular Air Force style. Three Gauntlets came through the murk against a background of black clouds. But the Ansons predominated by sheer weight of numbers.

The Under-Secretary of State for Air arrived at 1 p.m.—just after the present writer in Mr. Lindsay-Neale's Puss Moth. The rain arrived at three-thirty.

Fifteen Ansons formated twice in perfect order, recalling the wholesale reconnaissance flights carried out during the recent Combined Fleet Exercises. In the set-piece three Ansons, attacked by the three Hinds, suffered total eclipse, though not before the dummy crew had been evacuated by parachute and the little house on the aerodrome fired. Flames crackled merrily; rescue squads in gas-masks got busy, and the defeated Ansons dived and made an intimate tour of the Thanet coast, while a rich Scots voice broadcast explanations and introduced an aerobatic Hind. When the blackened skeleton of the little house stood bare against the sky, nine Ansons individually and in formation dived low on a number of meandering lorries, each attack making the right amount of noise and smoke.

The Straight Corporation carried about 300 joyriders, Mr. Whitney Straight supervising in person.

The excellent indoor exhibitions of airmen's kits, aeroplane parts, components and armaments became more popular as the rain continued. A swimming programme was due to start at 4.30, but visitors had seen enough water by then. A demonstration of physical training, accompanied by the Station band, drew many bright eyes from the flying.

Manston might have been lent a few more representative types of machines, but skilful flying and good organisation of the material available gave its 5,000 visitors an excellent show. Dusk and the rain were falling as our Puss Moth taxied out. A few last lingering guests walked about or waited for buses and a squad of airmen industriously cleared the debris. We asked Group Capt. Strugnell if he was satisfied with the day. "I am certainly not," he replied. The R.A.F. never are.

BIGGIN HILL

IN spite of the rain, which caused a delay in the proceedings, the attendance at Biggin Hill was approximately 10,000, while the well-arranged parking arrangements coped with somewhere between 7,000 and 8,000 cars and motor cycles.

Among the machines seen in the aerodrome, and later aloft, were Gauntlets, a Hurricane, an Anson, a Blenheim, a Wallace, an Audax, a Tutor and a Magister.

During the afternoon the station was visited by Sir Kingsley Wood.

While watching a display of individual aerobatics by a Gauntlet of No. 32 (F.) Squadron one could not help pondering on the extreme manœuvrability of the biplane fighter and reflecting that air displays in future years may lose something of their spectacular value, however impressive the sheer velocity of the monoplane which is replacing it.

An Audax pilot, picking up messages, made no mistake, though visibility was none too good and bumps were obviously being experienced within a few feet of the surface.

Formation drill by Nos. 32 (F.) and 79 (F.) Squadrons under most difficult conditions clearly impressed even the uninitiated with the extraordinarily high standard of efficiency of both personnel and machines.

Then followed a very fine display of flight aerobatics by three Gauntlets, accompanied by broadcast R/T. orders and running commentary by the leader. Their display, which included loops, rolls and "shootings-up" in close company, ended in a low dive on the hangars in incredibly tight formation.

A comic touch was added to the afternoon by a Tutor's attack on an elaborated Hucks starter with flapping wings. This was followed by an A.A. gun attack on a drogue towed behind a Wallace; apparently the Biggin Hill "Archies" draw their ammunition from the store which used to supply the Hendon Display, for one recognised the same curious "shell bursts" displaying the oddest independence of the efforts of the gun crew.

Finally, the fly-past by aircraft exhibited in the park afforded an interesting comparison between relative speeds.

LEUCHARS

TORRENTIAL rain throughout the day did not prevent the hardy Scots from turning out to visit Leuchars aerodrome. At two o'clock there was a particularly heavy downpour, but in spite of this cars, motor cycles, bicycles and pedestrians could be seen filing steadily into the aerodrome.

A spectacular and exciting programme, including synchronised aerobatics by two Nimrods, a formation flight by five Tutors and bombing of an "aircraft carrier" and a "destroyer" on the aerodrome had been arranged for the visitors.

Unfortunately, owing to lack of any wind, it was not possible for the launching of aircraft from the catapult to take place. Spectators were, however, able to see a machine being hoisted and placed in position on the catapult.

The greater part of the arranged programme was performed and spectators had their last and greatest thrill when the beautifully built "warships" H.M.S. *Curious* and H.M.S. *Versatile* were bombed and set alight by three Harts diving in perfect formation.

A source of amusement both to the children and the adults was the antics of the "Loch Ness Monster," which performed all kinds of flying tactics without leaving the ground.

Ground exhibits presented a great attraction to spectators, and at all times during the afternoon officers and airmen could be heard explaining the various types of machinery to interested listeners. The Link Trainer drew vast crowds, and the officer in charge was kept extremely busy demonstrating its working. One hangar was entirely devoted to refreshments and did great credit to the officers at Leuchars, who themselves had taken on the large job of catering.

The most spectacular hangar was the one showing various ground sections at work. In one corner airmen were busy packing and unpacking parachutes; there were also demonstrations by the Photographic, Medical, Wireless and Armament Sections. The new fire tender, with airmen dressed in fire-fighting outfits, was a great attraction.

Sir Kingsley Wood toured a number of stations by air. He is seen at Hendon with Air Chief Marshal Sir Cyril Newall, who accompanied him.

It can be safely said that, in spite of the worst possible weather conditions, every visitor to Leuchars Aerodrome — and there were 8,000 of them — appeared interested and thrilled.

HANWORTH

AT Hanworth the weather cleared just as proceedings began, and the programme was mainly affected by the non-appearance of a number of the civil aircraft that were to have been demonstrated, though one or two of the Service items also failed to transpire.

The aerodrome Reserve school did its share, the instructors giving a fine low-altitude aerobatic show on B.2 Trainers and Harts, and the pupils busying themselves with the ground organisation, a process in which the ubiquitous push-bike seemed to play a large share.

Undoubtedly the most appealing part of the flying display was the comings and goings of five Fairey Battles of No. 105 (B.) Squadron from Harwell, Berks, which did formation drill and low-altitude bombing with smoke bombs at a ground target. During the course of the afternoon the Battles made quite a number of take-offs and landings; as Hanworth's unconventional shape and the direction of the wind compelled these processes to be effected quite close along the front of the public enclosures, even the uninitiated had a real insight into flap technique.

When not flying the Battles were parked where young England could—and did—fondle them, and so was a Hawker Hurricane, which later ripped the Hanworth sky as it had never been ripped before. A formation of nine Hurricanes, purposefully proceeding from A. to B., passed over during the afternoon. A Gauntlet pilot from No. 54 (F.) Squadron, Hornchurch, completed the Service show with a finished aerobatic display.

Outstanding among the comparatively small number of civil demonstrations was a close-formation act by Messrs. Brie and Marsh in two C.30 Autogiros. To watch rotor-tips whirling within a few feet of one another as the two machines made steep turns together would have been a little chilling, to say the least, had one not known the competence of the pilots.

The tricycle club—B.L.G. Avian, Monospar, Arpin and S.C.A.L. pusher—cavorted entertainingly, though a fifth member, the Scheldemusch, arrived just too late from another aerodrome.

A Tipsy, the General Aircraft Gygnet, a Monospar, an Aeronca, and the Chilton were all nicely demonstrated, and the Short Empire boat *Corinthian* arrived and made a number of circuits, fast and slow, though Capt. L. A. Egglesfield did not descend to the profoundly low altitude at which he visited Heathrow with *Calpurnia* three weeks before.

"Flight" photograph.

See how they run! A dual-control Swordfish, equipped with cockpit head-rests for catapulting in comfort, causes a stir at Calshot.

HENLOW

EARLIER in the week a Valentia had borne us doggedly to Henlow that we might witness the odd item in the dress rehearsal. As things worked out, we had almost to be dragged by the scruff of the neck from the School of Aeronautical Engineering where science was being popularised most instructively.

On Saturday we swore to keep on the aerodrome for the all-too-short duration of our visit. Not even the Parachute Repair Section, the General Engineering Squadron or the Officers' School of Aeronautical Engineering could lure us indoors. We pottered around the lines of cars reminiscing about the Hendons of yesteryear and wondered at the skill of the gunner in a Hind who swung his blank-charged Lewis apparently oblivious of "g," attitude and draught.

Then we were offered a seat in the tail of a racing Virginia, limit machine in a handicap event. We were up against a Moth, a Prefect (practically a Tutor) and a Hind. Far from being stripped, the Hind had a parachute-release excrescence under the fuselage; our 'Ginny was sporting two pull-off platforms in the region of the outboard struts.

With a leonine roar we were away. The countryside trickled past under the vast acreage of our wings. One and a half laps, and still ahead, but with the Prefect nosing up. We found ourselves ducking into the cockpit to lessen resistance, but in vain; we could almost count the rivets on the Lynx's Townend ring. The elevator overhead moved and we looked down the vast tract of fuselage at the ground. Could we pick up enough in the dive? (The occupant of the nose cockpit subsequently informed us that the needle of the outboard A.S.I. once flicked round to 101). Alas, no. The Prefect, with conspicuous disregard for its elders, slid home with several lengths in hand. It was the first time we had hated an Avro. (Memo: Ask Messrs. Dancy and Rowarth for an estimate of the drag of parachute platforms.)

We were grieved to have missed the Queen Bee demonstration, but glad to have the chance of (probably) a last farewell to the old Virginia.

KENLEY

THE rain which had been steadily falling all the morning ceased just before Kenley's flying programme was due to begin, and a large crowd quickly gathered round the aerodrome. Those who had braved the weather were fully rewarded by a grand afternoon's entertainment.

The Gauntlets of No. 17 (F.) Squadron gave a display of individual and synchronised aerobatics and a Hawker Hector of 615 (A.C.) Squadron obliged with a demonstration of picking-up and dropping messages. A pupil-and-instructor act was the brightest item. Although the microphone would persist in "going off the air" when the commentator was about to explain to the crowd the clumsy flying of the pupil, the latter's antics in comparison with the polished evolutions of the instructor were so funny as to cause roars of laughter.

Great interest was displayed in the Hurricanes of No. 3 (F.) Squadron which were neatly parked on the edge of the tarmac, where the public could get a close-up view of our latest fighter. After taking off and disappearing for some time, the Hurricanes returned and treated the crowd to a demonstration of formation drill.

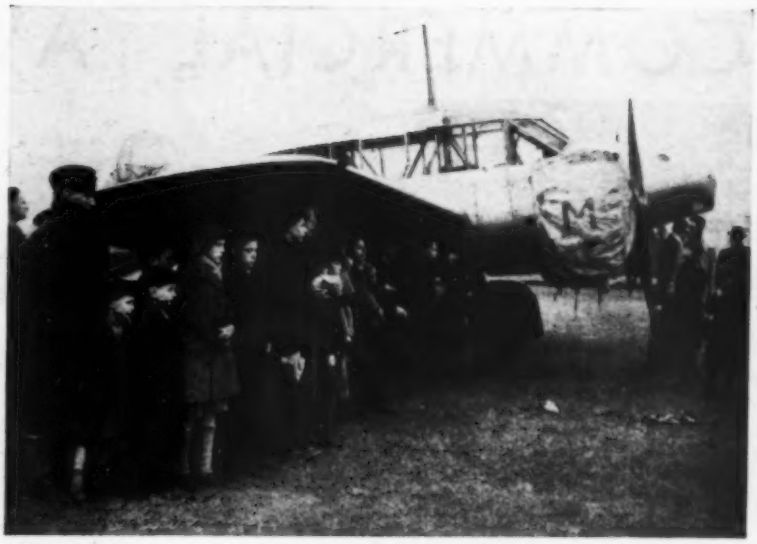
During the radio-telephony demonstration the public were invited to give orders to the pilot of a Gauntlet flying at 3,000ft. One woman spectator requested a falling leaf. The pilot did his best, explaining to his fair commander that the machine was not exactly suitable for this manœuvre; and then there followed some most unofficial R/T. conversation about a rendezvous at 7 p.m. . .

Despite the interest of the displays taking place in the air, a large proportion of the crowd found time to visit the hangars and examine the ground shows. The camera-gun film and the electric bomb release demonstrations attracted special attention.

Another interested crowd gathered round the Air Defence Enclosure to witness the A.A. display and the searchlight demonstration.

Joy-riding was so popular that Olleys had to telephone for a second Rapide.

Visiting aircraft included the Handley Page Harrow, Fairey Battle and Airspeed Oxford, all of which took part in the final fly-past.



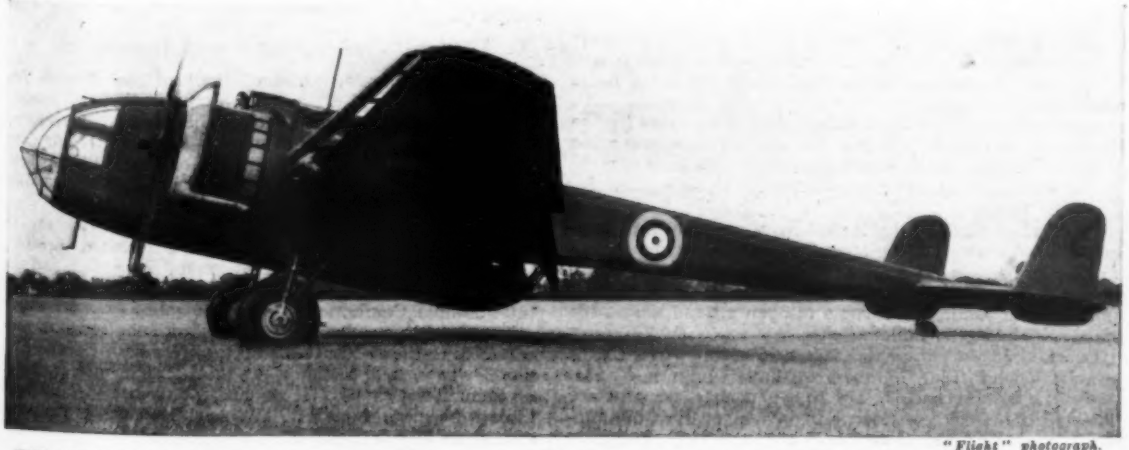
Symbolic? A general reconnaissance Anson at Hendon provides shelter against an unwelcome precipitation from the skies.

DUXFORD

THE Duxford show demonstrated what can be achieved with co-operation between the militant, mercantile and sporting branches of aviation. By way of example, the landing competition attracted a Moth and a Monospar from Marshalls, a Sutton Bridge Wallace, a Hart Trainer, a glider of the Cambridge University Glider Club, a brace of Gauntlets of No. 66 Sqn., a Tutor and a Battle.

It goes without saying that the weather caused a modification of the programme, but (among other things) Ansons from Bircham Newton obliged with formations; two C.U.A.S. Tutors did the pupil-and-instructor act; a pacific Whitley dropped manna from the skies; Gauntlets did the bidding of the public; and a well-trained trio of Gauntlets demonstrated aerobatics with great finesse.

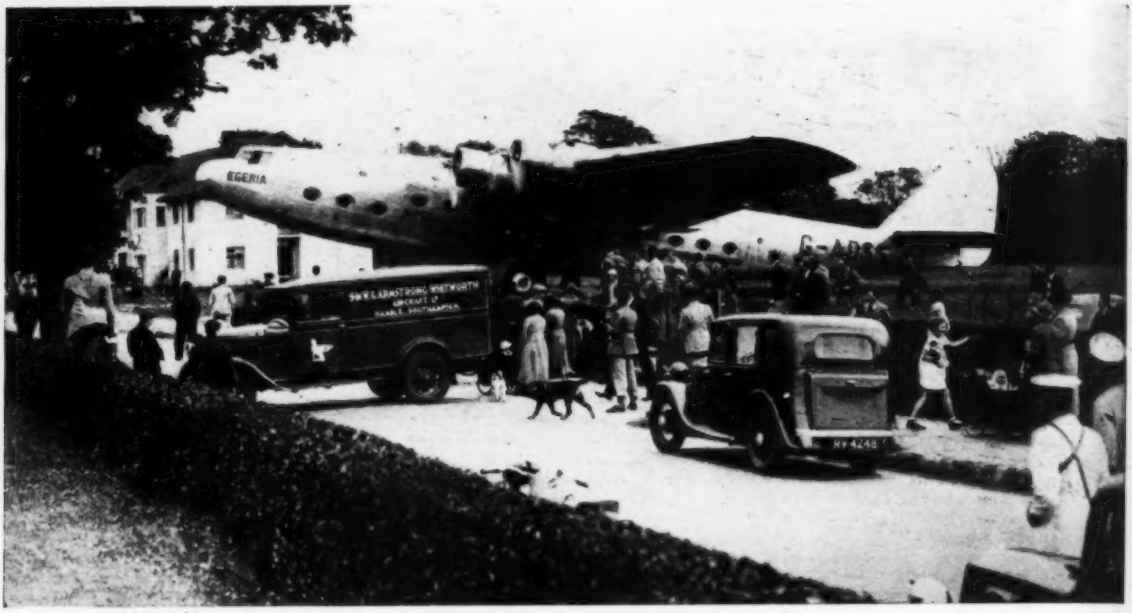
Marshalls had a Monospar, a Leopard Moth and a common Moth for baptismal and joy-riding purposes.



"Flight" photograph.

THE REVISED HAMPDEN: Liberal application of slots and flaps combines with clean design and Pegasus engines of the latest series to make the Handley Page Hampden bomber (seen here in its production form) one of the fastest machines of its calibre in the world.

COMMERCIAL AVIATION



EGERIA, second of the A.W Ensigns, crosses the road at Hamble on the way to her taxying tests.

THE WEEK AT CROYDON

"A. Viator's" Weekly Causerie on Airline Affairs at London's Terminal and Elsewhere

THE first Ensign is confidently expected to be at Croydon by Whitsuntide. This gigantic fly has escaped, unscathed, they say, from the clutches of the Martlesham spider, and is to be handed to Imperial Airways at once.

The first experimental transatlantic Albatross should also be ready, and before the end of the year Imperial Airways (who have been unjustly handled because nobody would give them the flying stock they needed and had ordered) should have a formidable fleet, including five Albatross 20-seaters with full facilities for serving meals on board, and ten or twelve Ensigns, besides, presumably, the second Atlantic Albatross.

I hear there will also be five more Empire boats, not of the present 18-ton class, but of 24 tons, and there are, they say, 40-ton boats on the stocks.

There seems to be some idea of operating Empire mails from Croydon with the new fast landplanes to some centre of distribution, such as Alexandria, where the flying boats will take them over.

Far from any death-knell being tolled at Croydon by the departure of British Airways (as one amusing journalist asserted), things will be busier than ever with Empire mail-planes and the K.L.M. England-Australia connection terminating there.

Of course, this death-knell stuff crops up every time anyone either opens up a fog-bound airport or decides to use one with thinly concealed rivers below its surface. Croydon has been "doomed" by schemes to make airports of half a dozen odd spots of open ground unsuitable for development as building sites.

Considering that the vital factor in future air traffic is control of increasing numbers of increasingly fast aeroplanes, it is mere logic to try to separate traffic, and not have all the airlines of Europe trying to get in at one pinpoint on the map, more or less at the same time of day, in bad weather.

Croydon is sorry to lose British Airways to Heston. Officials of other companies and heads of Government Departments said so in the usual way (good-humoured insults) at 11 a.m. last Saturday, when British Airways staged a decorous farewell party at the Croydon Airport Hotel. Croydon is sorry, yet glad, because there just is not room for every one, either in hangars or offices, not to mention the air. When you think that 30 minutes' delay in QBI before a machine can get into Croydon "along of the blokes in front" is quite usual, and when you consider that 1 hr. 30 min. is an ordinary schedule from the nearer Continental cities, the need for distribution of traffic becomes obvious.

British Airways' night mail and freight services will continue, if only temporarily, to be operated in and out of Croydon. I was surprised to learn, by the way, that B.A. operates more Continental mileage than any other British company.

Distinguished Arrivals and Departures

General Vuillemin, Chief of Staff of the French Air Force, with General d'Harcourt (Commanding the Second Air Corps) and other members of the Air Staff arrived at Croydon on Sunday last in an Air Force Potez for conversations and so forth. Another of these "suspicious movements of troops" for propaganda ministers to shatter microphones with.

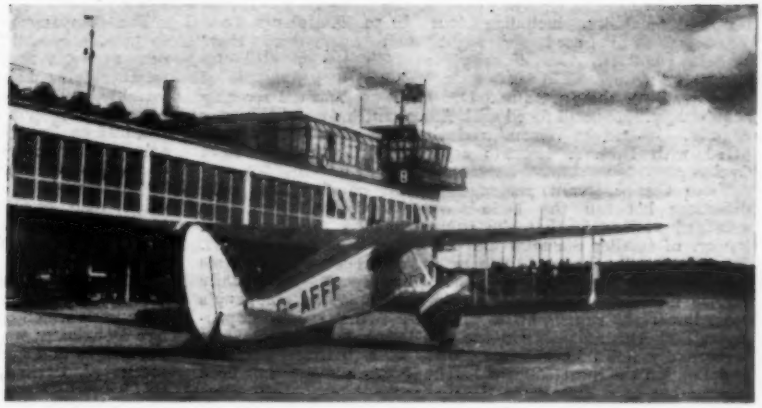
Lt.-Col. Sir Francis Shelmerdine, Director-General of Civil Aviation, and Mr. W. W. Burkett, Assistant Director, Overseas Civil Aviation, left Croydon for Rotterdam and the Hague on Sunday, too, for the twenty-sixth session of the International Committee of Air Navigation.

The Aerodrome Owners' Association sent some twenty members to the Berlin Conference of Northern Europe Airport Owners, held on May 31 June 1 and June 2. Most of them flew by D.L.H. or K.L.M. from Croydon, and most were glad, I suspect, as they taxied across Croydon airport to take off, that they did not own it. Mr. C. M. Newton, of Northampton, is president of the B.A.O.A., and leads the British party. He will introduce the delegates to General Goering and other notabilities.

Commercial Aviation

A NEWER BROMMA

Plans for the Extension of Stockholm's Airport: The New Blind Approach Line: A.B. Aerotransport's Fleet



LATE last year the originally conceived plans for Stockholm's airport at Bromma were completed, but already the visitor to the airport will hear the reverberations which indicate that still more of the surrounding countryside is being blasted away. In fact, a second plan is now being carried through, so that in the not very distant future the maximum run will be nearly 1,600 metres of paved surface in the N.W.-S.E. line.

Although experienced transport pilots have been bringing machines into Bromma in extremely difficult conditions during the winter months, the maximum run available at present is little more than 900 metres, which is not considered quite adequate for modern conditions. The extensions involve a modification to the blind-approach system. The main Lorenz beacon is now installed at the northern end of the main runway, which lies on a QDM of 340 deg., and pilots are guided on to this runway by means of mercury vapour lamps laid out on the comparatively clear gap in the approach at the southern end. When the extensions have been completed the beacon will be transferred to the south-east end of the new runway, so that approaches will be made from the opposite direction.

A fifth runway is, too, being laid out across the western side of the landing area in order to give another direction approximately mid-way between that of the present N.-S. runway and the N.E.-S.W. track. The addition of this runway will involve the layout of another extension beyond the terminal building in a northerly direction. One of the reasons for the development of the new long blind-approach run is that the prevailing winds blow from the south-east.

Around the present airport boundary regulations for buildings have been applied in order to leave the essential approaches as free as possible. In the north-westerly direction, for instance, these regulations prevent anyone from putting up a building the top of which is higher than an imaginary line at an incline of 1 in 40, and similar arrangements are made in other areas. The immediate work is being carried out on the preparation of the first half of the extensions to the north-west,

Bromma's terminal building (above) which has already been found to be too small for requirements and is likely to be extended during the next year. Below is a glimpse inside the radio office; the operator is using the Telefunken equipment, while on his right will be seen the Marconi set which is used primarily for controlled zone work.

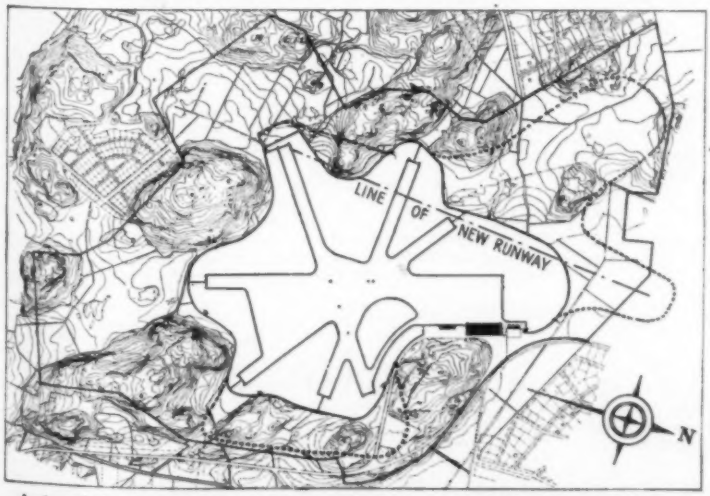
and very shortly the maximum available run will be increased to 1,000 metres.

The work has been an undertaking on a scale which has probably not been approached by any other of its kind, and the whole project has been carried through very largely as an unemployment relief measure. The cost of the undertaking has been shared equally by the State and the municipality.

The radio control system at Bromma is on the most modern scale, with two separate two-way medium-wave radio installations—Telefunken equipment for normal operations and Marconi equipment for QBI work within the five-mile controlled zone. At present there are four other Swedish D/F stations, and a new station is being arranged at Visby on the island of Gotland. A very complete teleprinter connection is maintained with Malmö, Hamburg, Turku and Helsinki, and next year there will be a through line to Göteborg. Four of the five available floodlights are now in use, and a fifth will be brought into action as soon as extensions permit its useful functioning. Additionally, as has already been explained, there is a line of guiding mercury vapour lamps on the QDM 340 deg. approach line. Both the radio and meteorological services are State-owned and operated.

The manager at Bromma airport, Mr. Bertil Florman, was originally in charge of the A.B. Aerotransport seaplane base in Stockholm, and when this company transferred its operational headquarters to Bromma he came over. Since January 1 this year the airport management has been in the hands of the municipality, and Mr. Florman is no longer officially connected with the operating company.

A.B. Aerotransport now have in all



A plan of the airport layout showing (dotted) the approximate shape and size of the planned extensions, with the line of the new runway. Eventually, the blind approach run will lie N.W.—S.E.; at present it lies parallel with the buildings.

thirteen machines, including four Ju.52 landplanes, one Ju.86 which is used for night mail work, and three Douglas D.C.3s. Additionally, a fifth Ju.52 still remains on floats. In order to reduce the number of spares carried, the Ju.52s and D.C.3s, as well as the recently acquired Ju.86, are all fitted with American Pratt and Whitney engines. It will be remembered that the standard Ju.52 is fitted with B.M.W. Hornets and the D.C.3 with Wright Cyclones.

From the observant passengers' point of view, the only difference between the Twin-Wasp-engined D.C.3 and the standard version is that the engine cowlings are somewhat longer, of smaller diameter and are fitted with cooling flaps. In performance there is little or no difference between this machine and its Cyclone-engined counterpart. The daily service from Stockholm to London, which is the company's most important run, is made with only two stops—at Copenhagen and Amsterdam. On the two longer hops the Douglas is normally flown at about 9,000ft., while between Schiphol and London the most efficient height for the distance has been worked out at a little more than 7,000ft.

The company makes a special selling point of what they so pleasantly call "sunshine flying," and on this particular run, at least, the distances are long enough to make overweather flying technically superior. Nowadays it is quite comfortably possible to fly not only from Stockholm to London in an easy day, but also, by co-operation by Aero O.Y., from Helsinki to London. The Aero Ju.52 leaves Helsinki airport at 7.30 a.m. and reaches Bromma, after a short stop at Turku, in good time for the passengers to be transferred to the London-bound Douglas. Thereafter it is merely necessary to eat, drink, read, or sleep for a few hours, with reasonable periods of relaxation at the two stopping places. Incidentally, during the pause at Schiphol on our return journey from Helsinki it was possible to see just how attractive to the visitor an airport could be made. Although it was a week-day, and not by any means full summer, scores of spectators were taking tea in the restaurant which overlooks the tarmac on which, at one period, five Douglasses were lined up. Every few minutes there were departures and arrivals, and the visitors were quite obviously interested, excited, and, perhaps, proud of the Netherlands' so obviously strong position in air transport.

Composite to Canada

IT is expected that *Mercury*, the upper component of the Short-Mayo composite machine, will be making her first flight to Newfoundland at the end of this month. In the meantime she will be making a "local" endurance test flight. Air Ministry tests, including a full-load separation, were completed at Felixstowe a fortnight ago. The machine will be fitted with new engines for the Atlantic experiment. Capt. A. S. Wilcockson and Capt. B. C. T. Bennett have been assigned for special duty in connection with the experiments.

British Airways at Heston

FOLLOWING a somewhat hectic week of removals and rearrangements, British Airways are now finally and firmly installed at Heston Airport. After the difficult period during which the company has had to carry on its operations from Croydon, while its main service and school centre was Gatwick, this move must come as a distinct relief to the staff. At present, for obvious reasons of convenience in a pooled service with D.L.H., the night mail Ju.52s are still using Croydon, though they are maintained at Heston.

Although things in the big service hangar at Heston are naturally not yet shipshape, the move has been planned very well indeed and everything should be in working order before the end of this week. Before the move Mr. Capel, the chief engineer, worked out a complete plan for the arrangement in the hangar so that, when the different items and departments came over, there would be no possibility of muddle. Probably this hangar is not actually quite as large as the one originally used at Gatwick, but, since there is ample office and other accommodation, it is, effectively, more suitable for the work and there should be plenty of room even for the Lockheed 14s when these start to come over in July.

Meanwhile, the Airwork service department has been moved into a new hangar at the eastern end of the tarmac and the Airwork office staff is now installed in a large single-storey building on the right of the entry drive. A new traffic office, which is nearly ready and now in use, has been built on the site of the old one, and very shortly it should be possible to remove the ugly wooden structure which has, during the past month or two, accommodated the Customs officials.

Part of British Airways' new traffic handling buildings at Heston are seen in this photograph. Behind is the existing control tower.

The British Airways Lockheeds are putting in an average of 1,700 hours a year and the whole business of maintenance has been very well mastered. In fact, the staff has become sufficiently skilled—though none of them had previous stressed-skin experience—to tackle major structure-repair work. Earlier this year, it will be remembered, one of the Lockheeds struck the iron fence at Croydon while coming in in very QBI conditions. Nobody was hurt, but the machine suffered extensive damage to both the fuselage and the wing. The leading edges both of the outer and the centre sections were pushed in, the spar was damaged and the fuselage badly dented and ripped. Within six weeks, starting without proper jigs and tools for the work, the machine was in service again. The cost was about £1,500, while the insurance people who originally examined the wreckage considered the machine to be an 80 per cent. total loss.

Venice—London

ON Sunday an Avio Linee Italiane Fiat G.18 monoplane came into Croydon from Rome, via Milan, Turin and Paris, on a survey flight preparatory to the start of a regular service, which is expected to start during this week. Actually, it should have started a month or two ago, but there was apparently some difficulty with the negotiations. The Fiats which will be used can fairly be considered as the fastest commercial machines in regular service in Europe at the present time, though their performance will be bettered by the Lockheed 14 when K.L.M. and L.O.T. put them into regular use.

South American Experiment

SOMETHING like three years ago two Uruguayan brothers, Alberto and Jorge Marquez-Vaeza, decided that there would be distinct possibilities in an air service linking the more important towns in the Republic with Montevideo. By way of experiment they purchased two D.H. Dragonflies, and were granted a concession from the Government to run from Montevideo to Salto and Riviera with three trips weekly on each service.

The existing terminal aerodrome (Melilla) at Montevideo was used, and suitable fields were duly surveyed and cleared at other selected stopping places. At the beginning of this year the company, known as Primeras Lineas-Uruguayas de Navegacion Aerea, had completed nearly fourteen months' of service, in which all but two of the scheduled runs had been made, and carrying nearly 3,000 passengers, as well as letters, newspapers and parcels. The Dragonflies were specially fitted to carry a maximum of five passengers with a pilot and co-pilot, though, of course, the fuel load was reduced.

After this successful first year the Government granted a useful if modest subsidy—£4,500 per annum at the free exchange rate—and the company ordered a D.H.86B. This has now been in service for four months, carrying an average load of more than 90 per cent. of its capacity. During March this year the 86 and one of the Dragonflies carried 353 pas-

COMMERCIAL AVIATION (CONTINUED)

sengers between them, and of the sixteen available seats on each trip an average of 13.07 were occupied. Somewhere, evidently, there is little difficulty in obtaining the necessary traffic.

More recently the Salto service has been extended to Artigas, while at Rivera, on the other line, the service links up with the Brazilian V.A.R.I.G. machines from Porto Allegre. The value of the two services may be estimated from the fact that the Artigas run saves more than eighteen hours on surface transport—there are only two trains every week—and the Rivera service saves nearly fourteen hours.

Uniform Airport Charges

LAST Monday representatives of the Aerodrome Owners' Association left London for Germany, where they will inspect the airports at Berlin, Hamburg and Bremen. They are going at the invitation of the Reichsverband der Deutschen Flughäfen—the German Airports Association—with whom they will discuss the feasibility of arranging uniform fees and charges at all European airports. The delegation, which numbers fifteen, is headed by the chairman of the association, Mr. C. M. Newton, and includes representatives of Perth, Birmingham, Brooklands, Newcastle, Shoreham, Sywell and Southampton aerodromes, as well as of the Straight Corporation, which, of course, has taken over six airports in this country.

The Burnelli in England

THE Burnelli monoplane which is being built in this country is well on its way in No. 2 hangar, Southampton Airport, which has been taken over by Cunliffe Owen Aircraft. Most of the basic structure has been completed and the machine should be flying during this summer. The original Burnelli, which has been seen at Croydon, Hatfield, and elsewhere in this country during the past six months, is also based at Southampton. Apparently the production Burnelli is to have Bristol engines.

Incidentally, things are really moving in the matter of providing an adequate control centre at Southampton Airport, and work on the building should be started during the next month or two. In the meantime, Mr. Payne, the airport manager, and his assistants are carrying on in temporary quarters—as they have been doing for the last two years.

A Civil Perseus Type-tested

FOLLOWING the recent announcement of a moderately supercharged version of the Bristol Perseus comes notification of a specially developed civil type known as the XII C series. This will be the first commercial sleeve-valve aero engine in the world to be put into series production.

With a bore and stroke of 146 mm. and 165 mm., the capacity of the engine is 24.9 litres. The economy in fuel consumption and upkeep costs and the general simplicity for servicing should make it very appealing to commercial operating companies.

Already considerable experience of the Perseus type has been gained by Imperial Airways, who flew this engine for nearly 2,000 hours under routine airline conditions. As a result of this experience a number of the Short Empire flying boats are to be equipped with the Perseus XII C. Several new machines, including the twin-engined De Havilland 95, are also scheduled to be powered by this unit.

A satisfactory type test has been completed for the XII C, and the following ratings have been accorded:—

International: 680/710 h.p. at 2,250 r.p.m. at 4,000ft. Maximum rating (5 min.): 815 h.p. at 2,600 r.p.m. at 6,000ft. Maximum take-off: 900 h.p. at 2,700 r.p.m.

It is stated that inspection of the test engine after stripping showed the sleeves, the pistons, sleeve-driving mechanism and accessory-drive box to be in exceptionally good condition.

Besides this civil-rated Perseus XII C comes news of a fully supercharged Perseus engine known as the X, which has also recently passed its type test. The rating of 880 h.p. at 15,500ft. represents a substantial improvement over the performance of contemporary poppet-valve engines of equivalent size and duty.

The overall diameter of the engine is only 52in., and it has been developed in particular for high-altitude, high-speed fighting aircraft. Although the engine is fully supercharged, with 3 lb. boost at 2,650 r.p.m., the take-off output is as much as 750 h.p. The international rating established at the type test is 700/730 h.p. at 14,500 ft.

More Public Education

THE majority of the bigger air transport companies now appear to be issuing little pamphlets in which quite a deal of serious operational information is provided for the edification of passengers—who are now becoming accustomed to the idea of and reasons for such things as high-altitude flying.

Deutsche Luft Hansa have recently produced a pamphlet describing not only operational methods and the features of the more modern machines in their fleet, but also explaining the instruments used and the methods of organisation at airports. They even go so far as to explain diagrammatically the operation of the blind-approach system, and cover simply the work involved in inter-flight maintenance. All of which should give the intelligent passenger a proper confidence in airline travel.

New York—Bermuda

SINCE April 6 the western terminus for the Bermuda service has been at New York again after a winter at Baltimore. The position is somewhat complicated by the fact that the Pan-American workshops and technical staffs remain at the latter point. Incidentally, P.A.A.'s bid for the mail contract on this run has been accepted.

One of the curious features of the winter operations of this service has, it seems, been the extraordinary wind conditions experienced. According to *Shell Aviation News*, the wind at 1,000ft. was often entirely different from that reported by shipping companies at sea level, and when speeds of 30 m.p.h. or less were registered down below the upper air sounding showed gales of a velocity as high as 140 m.p.h. at 10,000ft. On a number of occasions the upper wind was, in fact, so strong that services had to be suspended.

Two American Disasters

FOLLOWING the accident, some time ago, to the first of the company's Lockheed 14s, the disaster to another of North-West Airline's fleet of these machines on May 16 was a particularly tragic one. The machine was carrying nine passengers, most of them employees either of the Lockheed Company or of North-West Air Lines, and was actually on its delivery flight when the accident occurred. The burnt-out wreckage was discovered in a canyon in the Sierra Pelloria mountains between Southern California and the Mojave Desert, and it is supposed that the pilot had been descending through low cloud to find landmarks.

On May 24 United Air Lines also suffered when a machine, apparently a D.C.3, crashed with a loss of ten lives, eight miles short of Cleveland on the Newark-Cleveland run. Preliminary investigation suggests that both engines cut out simultaneously.

Forthcoming Events

May 28-June 13. Belgrade Aero Show, Yugoslavia.
June 3-6. Opening meeting, Reigate Soaring Site.
June 4-6. Manx Air Races.
June 11. Bristol and Wessex Aeroplane Club: Garden Party.
June 18. Lancashire Aero Club: Garden Party.
June 18 and 19. Brooklands Four-club "At Home."
June 22-28. F.A.I. Conference, Berlin.
June 25. Official opening of Wolverhampton Airport.
June 25. Air Display, Gatwick Airport.
June 25. Official opening of Ringway Airport, Manchester.
June 25-July 1. Magyar Pilota Picnic, Budapest.
June 30. Aero Golfing Society: Jubilee Cup, Prince's, Sandwich.
July 2. R.Ae.C.: King's Cup Race.
July 9. Ipswich Aero Club: Flying Meeting.
July 9-17. National Gliding Contests, Dunstable.
July 15. Isle of Wight Flying Club: Rally and Gymkhana, Lea Airport.
July 16-18. Deauville Rally.
July 16. Official opening of Luton Municipal Aerodrome by Secretary of State for Air.
July 17-24. Third Littorio Rally, Italy.
July 23. County Flying Club: Flying Meeting at Rearsby, Leicester.
July 29-August 1. Courtrai Rally, Belgium.
July 30. Official opening of Exeter Airport.
July 30. Folkestone Aero Trophy Race, Lympne.
August 27-28. Southend Flying Club: Flying Meeting.
September 3. Cinque Ports Wakefield Cup Race, Lympne.
September 10. Cardiff Aeroplane Club: London-Cardiff Race.
September 11-18. Swedish Civil Aviation Week, Stockholm.
September 21. Aero Golfing Society: Cellon Trophy, Richmond Golf Club.
November 18-December 4. Paris Aero Show.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

HOME AGAIN: Sqn. Ldr. K. B. Lloyd (right) and Wing Cdr. Feather, of No. 204 Squadron, on their return from the Australia cruise, the completion of which is recorded on p. 554.

THE RT. HON. SIR KINGSLEY WOOD, Secretary of State for Air, has appointed Mr. F. H. Sandford to be his principal private secretary and Mr. R. C. Chilver to be his assistant private secretary. Sir Edward T. Campbell has been appointed Parliamentary private secretary.

Capt. Harold Balfour, Parliamentary Under-Secretary of State for Air, has appointed Mr. F. R. Howard to be his private secretary.

Capt. Ugo D'Annunzio was arrested at the Seversky Field, Long Island, and charged with "assault" after his aeroplane ran away while he was trying to start it unaided. A woman was pinned against her car and severely injured.

The Canadian Car and Foundry Company of Montreal is to manufacture in Mexico, for the Mexican Government, 40 Grumman machines and 10 Trainers during the next two years. Machinery is being removed from Montreal to Mexico to start the factories.

Twenty-three Fairchild high-wing cabin monoplanes (145 h.p. Warner Super Scarab engine) have been purchased by the U.S. Bureau of Air Commerce. Typewriters, brief cases and files will be built-in, and all machines will have blind-flying and radio equipment.

The Danish Government has purchased a Dornier Wal flying boat that has been used for several years on the Lufthansa South Atlantic mail service. This machine, which has two water-cooled B.M.W.s rated at 1,300 h.p. together, will be used for an arctic expedition conducted by the famous Danish explorer, Dr. Lauge Kock.

A suggestion that Eire should have an aircraft factory was made by Col. Charles Russell, President of the Irish Junior Aviation Club, when speaking at a meeting of the Club in Dublin. He said that he had an offer from one of the largest British aircraft manufacturers to provide the necessary technical direction to manufacture aircraft under licence.

The Lockheed Co. has identified a wheel, found off the coast Burma last May, as belonging to the Altair of the late Sir Charles Kingsford Smith.

The new soaring site at Colley Hill, Reigate, is to open with a meeting from to-morrow until Monday. Details from Miss Ann Edmonds, London Gliding Club, Dunstable.

During the afternoon of June 4 commentaries on the London-Isle of Man Air Race will be broadcast in the B.B.C. Northern programme from Speke Airport, St. Bee's Head and Ronaldway Aerodrome, while on Whit Monday afternoon there will be commentaries on the Manx Air Derby and Tynwald Air Race.

An American firm—the E. G. Budd Manufacturing Company—has built an all-stainless-steel wing for the new 300 m.p.h. Seversky pursuit machine. It is said to be a few pounds lighter and to have four times the rigidity of its aluminium alloy prototype. The new Seversky Super Clippers, described in *Flight* of March 31, will be built of stainless steel.

Thirteen Canadian aircraft companies have indicated their readiness to supply British aircraft demands. France may also call on Canada to supply extra aircraft.

Has anyone found out (a) who first discovered the windsock, and (b) which aerodrome was the first to use one? Imperial Airways are trying to find its origin.

The Aircraft Engineers' Association is holding its first lecture on Friday, June 10, at 7 p.m., in the library of the R.Ae.S., when Mr. Messiter, of the Sperry Company, will speak on the Gyropilot. Tickets are obtainable through members.

Michel Detroyat, the French test pilot, accompanied by M. Henri Guillaumet, chief pilot of Air France, have been making an American tour and have inspected, among other things, the Douglas DC-4, which, incidentally, has recently undergone its static tests.

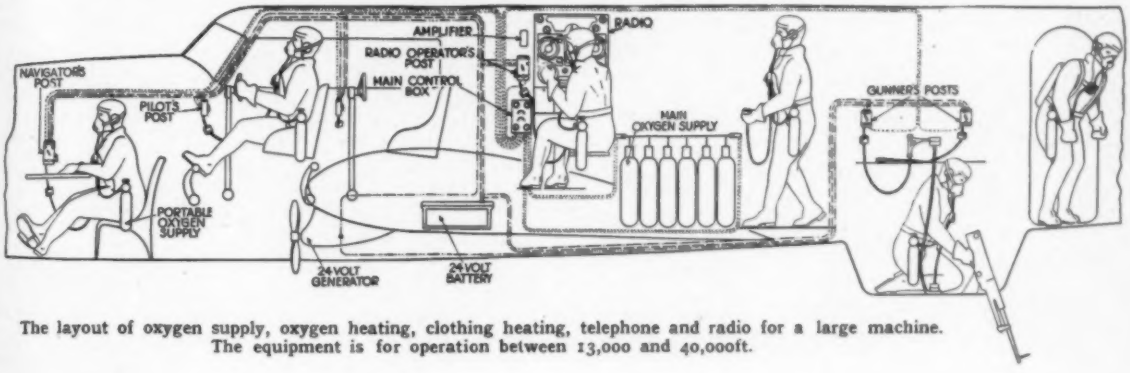
A clock has been erected on the new Cricklewood buildings of Smith's English Clocks, Ltd. It has four dials, each 10ft. square, and each pair of hands is 5ft. long. The chaplets and hands will be brilliantly illuminated by white neon lighting, giving Greenwich time and providing a distinctive air beacon.

Following nautical "crossing the line" ceremonies, passengers passing over zero latitude in Imperial Airways' flying boats will from now on receive "an elaborate certificate of contemporary travel." Imperial flying boats cross the Equator over Lake Victoria, and on the Australian route at Lingga Archipelago, south of Singapore.

DRAWING-POWER: Enlarged and coloured reproductions of Max Millar's cutaway *Flight* drawings of modern aircraft are proving one of the biggest attractions ever staged in the windows of the R.A.F. recruiting depot in Kingsway.

HIGH-ALTITUDE EQUIPMENT

An Explanation of the Avimo Oxygen, Heating and Communication Unit System



The layout of oxygen supply, oxygen heating, clothing heating, telephone and radio for a large machine. The equipment is for operation between 13,000 and 40,000ft.

IF the impedimenta necessary for high-altitude Service flying continue to grow in complication at their present rate, the time will come when a pilot or member of a crew will be as hampered in his movements as a diver.

This possibility has been foreseen by at least one manufacturer, and an equipment of a quite simple type has been evolved providing for telephone, radio, heating and oxygen connections.

In the past clothing has been heated electrically and oxygen supplied, but the regulation and control of these supplies has in many cases been inclined to absorb too much energy and attention. In most cases, too, a member of the crew has been tied down to one source and has, therefore, been unable to move about. An additional difficulty arises in an emergency since vital seconds may be lost in disconnecting and disentangling wires, pipes and straps.

The equipment patented by the French Bronzavia Company (for whom Avimo, Ltd., of Taunton, Somerset, are licencees in this country) should greatly minimise all these difficulties. Throughout the system the services are combined in a duplicated 13-mm. diameter conduit cable carrying twelve electric wires (for radio and heating of the suit and the oxygen supply) and the oxygen tube.

The equipment can conveniently be divided into two parts, the suiting and tackle worn by the individual and the fixed equipment in the aircraft.

The flying suit is heated by a 3 ohms resistance and a mask contains a small microphone and a close-fitting oxygen inhaler, while messages are received through earphones in the helmet in the usual way. This whole equipment is connected to the supply cable by a spring-loaded plug which, by the twist of a button, is ejected, leaving the wearer entirely unencumbered.

A small emergency cylinder of one-litre capacity, and made of duralumin, contains sufficient oxygen for twenty-five minutes breathing; this, combined with a pressure valve and supply regulator, is used in case of a breakdown in the general equipment, for a parachute jump or for moving about the aircraft. This emergency cylinder with its accessories is very light and is carried on the belt. Equipment of this type was, incidentally, used by the Frenchman Williams for his recent world-record parachute descent.

All connections, including those from the emergency supply, are carried to a small metal box on the chest, and it is into this box that the main flexible conduit is plugged.

At each of the crew's stations a control box is placed, connected to the main supplies. This box contains the resistances to the heating of the clothing and oxygen, and the signals for the telephone system. A small oxygen flowmeter is also mounted upon it. The control boxes vary in size according to the service required of them; taking the equipment of a commanding officer as an example, a metal box 7in. by 3½in carrying an ebonite switch for heating with weak, medium and strong positions and the various controls and indicators referred to, would be provided.

Communication

Permanent inter-communication is possible on the telephone, but the wireless operator and commanding officer each has a switch on his control boxes for isolating himself from the general circuit and cutting in on the wireless installation. Indications that a member of the crew wished to call the officer is given by light signal on his control box.

On disconnecting the plug to any individual equipment the mouth of the oxygen tube is automatically closed by a valve. A further precaution is provided in case of dynamo failure, a cut-out ensuring that current is taken from the storage batteries for oxygen-heating and telephone systems only.

Telephone and electrical circuits are of normal type, but the oxygen delivery apparatus is of novel design. In the case of a large multi-seater aircraft oxygen is contained in six large cylinders each of 1,000 litres and at a pressure of 150 kg/sq. cm. Oxygen from these cylinders is first reduced to normal pressure by a valve, and the volume of supply is then regulated barometrically by means of a cam rotating in direct proportion to the altitude. The system operates for altitudes between 13,000 and 40,000ft. and is arranged to commence delivery automatically, after a given height has been reached. Controlling instruments are duplicated as a precaution and an emergency short circuit is provided to cut out the whole of the apparatus without interrupting gas flow.

A lever which mechanically expands the controlling barometric capsule permits checking-up of supply before taking off.

DEATH of Mr. T. B. RINGWOOD

IT is with regret that *Flight* records the death of Mr. T. B. Ringwood, who was taken ill suddenly while playing golf. Mr. Ringwood had retired from service at the Air Ministry on October 31, 1936.

Born in 1874, he served his time as a pattern maker, and entered the Royal Aircraft Factory, Farnborough (now the Royal Aircraft Establishment) in 1912 as an Inspector of Aircraft and Spares.

He was one of the nucleus of factory inspectors who formed the A.I.D., and was transferred on February 15, 1914, as an examiner, holding the stamp "A.I.D. No. 1." He was promoted to assistant inspector, and in 1918, under the Ministry of Munitions, to inspector; during this period he was loaned to the Director of Supplies (Aircraft) from April to December, 1917. He was gazetted Lieutenant, R.F.C., on August 26, 1916.

On the formation of the Air Ministry he was appointed under the Assistant Director of Supplies (Aircraft), in 1920, to S.A.3 Branch and dealt with estimates and, later, with the investigation of costs.

Thomas Bursley Ringwood (writes a colleague of his) was known as a man whose honesty of purpose was never questioned, who gave his judgment fearlessly and yet with all consideration. His shrewd assessment of values was relied upon by his colleagues and respected by "The Trade."

At the funeral, on May 17, Mr. E. L. Pickles, O.B.E., represented the Directorate of Contracts, Air Ministry, and Mr. V. V. W. Vallance attended on behalf of his colleagues. Mr. W. A. Glen represented Vickers (Aviation), Ltd.

BALTIC TE

Helsinki's Airport wo Sep Lines : The Control eratio

(Left) This aerial photograph of Helsinki airport gives a good idea of the runway lay-out and of the nature of the surrounding country. The dark areas on the runways are the parts which have been tarred.

The air superintendent of Aero O.Y. and manager of the airport, Capt. von Willebrand (right), with the company's chief engineer, Mr Aulin.

IT is customary nowadays for airports to be opened with pomp and ceremony long after they have gone into use. In the case of the airport at Helsingfors, or Helsinki, as it is now known, which was opened officially on May 8, the landing ground had been in use for more than a year, but the new terminal building, though complete enough in outside appearance, is not yet ready. Actually, the first transport machine landed on the airport in December, 1936.

In the circumstances of weather and terrain the ordinary forms of airport construction cannot be applied, and at both Helsinki and Turku, where an airport was put into use nearly two years ago, the layout consists of rolled gravel runways, the gravel to be held together eventually by tar. At Helsinki the tar-laying process is quite far advanced and should be completed this year. There are four runways at this airport, and the terminal buildings are arranged in the south-east corner at a point where rising ground, in any case, prevents the area from being of use as an approach line.

During the past year the terminal arrangements have consisted of offices built into the single hundred-metre hangar, but now the structure of a separate martello-type building has been completed beside the hangar, and the entire organisation both of the airport management and of the Finnish operating company, Aero O.Y., will eventually be transferred there.

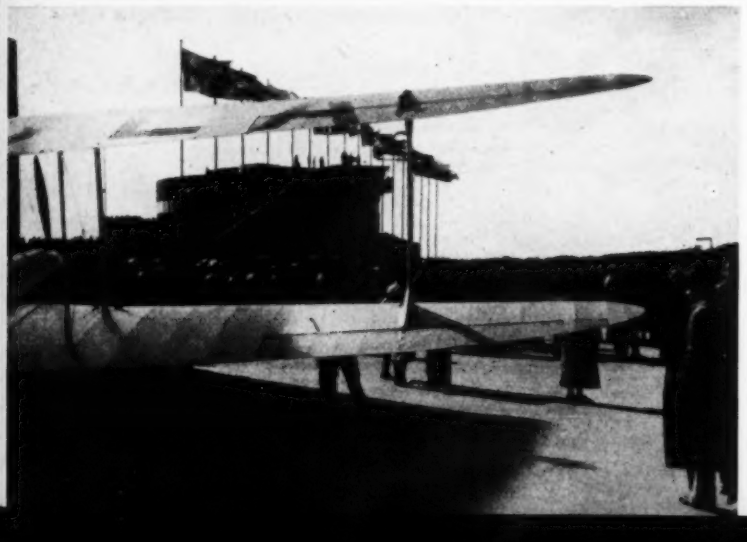
The most interesting feature of the airport is the fact that there are two entirely separate blind-approach beams at right angles to one another. Each has its separate main beacon and pair of marker beacons, the QDMs being 186 deg. and 96 deg. respectively. Helsinki, in fact, is probably the only civil airport in the world with such an arrangement.

The marker beacons are in each case 300 and 3,000 metres from the airport boundary. Duplication of this kind might appear to be somewhat expensive, but since one power plant and one repeater serves for all six aerials the scheme is not quite so extravagant as it sounds, and in any case Finland's long winter demands that both the radio and the lighting equipment shall be as up-to-date as possible. Both the blind-approach transmitters and the normal two-way radio equipment have been designed by Telefunken. Each of the runways is 800 metres in length, and extensions are being planned in an easterly direction. With heavy snowfalls during the winter and the effects of the consequent thaw the problem of drainage is naturally a severe one, and at the present time there is no less than forty kilometres of drains underneath the airport.

Heating of Hangar

Since for many months in the year the temperature is very far below freezing point, special attention must be paid to a point which is not often considered over here—hangar heating. Not only is the hangar kept throughout the winter at a minimum temperature of 10 deg. C., but there are special canvas pipelines and nosebags for heating power units up to 40-60 deg. C. This heating system is arranged so that four three-engined machines can be heated at the same time. In the coldest weather the system involves the use of about four tons of coal every twenty-four hours. In order to retain the heat the hangar roof is lined with asbestos and great care has been taken in the fitting of the sliding doors and similar items. In all there are five travelling cranes permanently in use in the hangar. Two of these are for really heavy work and can lift as much as fifteen tons, while the three others are more mobile and are used for such work as removing and installing engines.

The new terminal building is of the popular modern circular design in reinforced concrete, with three storeys of offices, and so forth, around a central booking hall. The only departure from symmetry in the building itself is the control room, a separate structure from which a complete view of the whole aerodrome is obtainable. Visitors and passengers have the use of a restaurant which also overlooks the landing area, and there is a special self-contained suite for visiting transport pilots. Inside the main hall the otherwise bare walls will be decorated with airline indicator maps, and it is possible that in due course a kiosk will be arranged in the centre of the floor. When this terminal building was officially opened



The scene at the opening ceremony, with the first of Aero's two Rapides in the foreground.

"Flight" photograph.

TICTERMINAL

Airport ... Separate Blind-Approach ... The Control Building : Winter ... perations

(Right) Typical of Finland's countryside, the township of Naantali, which lies ten miles to the north-west of Turku, where the first civil airport was laid out.

the interior arrangements had not been completed, but it was possible at least to see how these arrangements had been carefully planned. The two "arms" extending from the building—to be seen in the photograph below—are designed to simplify the rapid and tidy execution of the necessary customs and other formalities for ingoing and outgoing passengers, who will not, therefore, be wandering helplessly around the building proper. The fact that the tarmac, aerodrome and machines may be seen from the windows of the waiting rooms should prevent passengers from suffering the worry which so often appears to accompany a ten-minute snack before departure by air or otherwise.

For the present, at least, the airport is being managed by the air superintendent of the Finnish operating company, Aero O.Y., Capt. B. H. von Willebrand. With his practical experience of transport flying, he is naturally in a position to understand the difficulties involved, but it is still necessary for him to fly on the services from time to time, and it may be that the State will eventually appoint a permanent manager unconnected with the air transport industry.

Aero O.Y., which came into existence as long ago as 1923, at present operate two Junkers Ju.52s, each fitted with American Pratt and Whitney Hornets, and two D.H. Rapides, one of which has only recently been delivered. Since the country's internal airline system was first started last year no subsidy has been available, and the Rapides were chosen because of their ability to do the work as economically as possible. Internal services are being run this year between Helsinki, Viipuri and Tampere, but a service has also been planned and is operated experimentally to Petsamo in the far north, though the necessary landing grounds on this run are not in a sufficiently advanced state for regular through operations. At present the daily service ends at Vaasa, an hour's flight beyond Tampere, where the new Finnish State Aircraft Factory has been built.

(Above) Inside the present radio office which will shortly be transferred to the new terminal building. A single repeater and control panel is used for the two ultra-short-wave approach beacon systems.

Floats to Wheels

Until comparatively recently both the Ju.52s were on floats and the Aero services were, consequently, affected by winter conditions. Since Turku and Helsinki airports have been in action the floats have been replaced by wheels and the services are now operated all the year round. One of the two Ju.52s, incidentally, was actually the first of this type to be sold outside Germany, and this machine has put in something like 5,000 hours on floats and wheels. Contrary to general opinion, very little trouble is experienced in floatplane operation provided that the flying and ground crews are experienced, and in Scandinavia generally the floatplane is, in fact, considered to be more suitable for over-water transport operations than the flying boat which is so popular elsewhere. For the pilot of a single-engined landplane Finland is not an ideal country over which to fly, but none could be more pleasant for the seaplane owner.

(Right) The new Helsinki terminal building seen from the air. The control office structure will be seen on the left of the roof. When this picture was taken, work was still in progress on the construction of the building. The hangar in which the airport control personnel have, until now, been housed, is on the extreme right.

"Flight" photograph.

GRACE : The Minimoa sailplane in which Mr. Philip Wills has been putting up some fine performances, notably by establishing a British distance record of 206 miles.

PRIVATE FLYING

Topics of the Day

Formalities

EVERY now and again one is driven to becoming all excited and publicly voluble about the enormous and apparently unnecessary formalities involved in air touring abroad. Unfortunately, the people who might be able to do something about it do not have to suffer the sometimes lengthy delays at different Continental airports, nor do they have the opportunity of finding that the necessary documents and maps can take up an unreasonable proportion of the small space available in the average light aeroplane.

I have no doubt at all that this documentation is entirely necessary in international interests, but I find it difficult to see why it should be so difficult to get the necessary stampings and signings done in reasonably quick time. More than once I have been involved in a wait as long as an hour at a Continental aerodrome where a call would otherwise have been made only to refuel.

Yet if one travels on an international airline a scheduled stop can be as short as a quarter of an hour in spite of the fact that the machine concerned is taking on and unloading both passengers and freight. The fact, presumably, is that the procedure with a regular air service is a routine one and can consequently be carried out quickly, while the unfortunate private owner may not only arrive unexpectedly but has also got to discover where and how he can obtain the necessary stamps and signatures for his papers.

For the delectation of those who have never either taken a machine abroad or been an assisting passenger on such a trip it may be interesting to recount the items which must be carried—apart, of course, from the necessarily prodigious number of flying maps (if the tour is to be a long one), the customary passport and flying licence. This list includes the Journey Log Book, which is no mean volume, a Certificate of Registration, a Certificate of Airworthiness, a large book of Customs Carnets, together with Customs and Excise forms and fuel Carnets.

The Carnets are, of course, to be considered as documents carried in a very good cause indeed, since without them it would be necessary to pay and have returned a colossal deposit in each country visited and to hand out large and sometimes bulky sums for each thirty or forty litres of fuel. Additionally it is usual, though not absolutely necessary, to carry an Aircraft Log Book—which matches the Journey Log Book in size—an Engine Log Book and one's own flying log book, with an F.A.I. identity card if one requires free housing and landing.

All this forms so much non-paying load, and there is always a risk that one or other of the items will be mislaid; but my primary objection is, as I have said before, to the amount of time wasted everywhere in having these documents dealt with.

Restrictions

NOWADAYS, with war and rumours of war, one's difficulties are increased by the number of prohibited areas, some of which grow up almost overnight, and the sparsity of the corridors through which one may fly from one country to another.

A few weeks ago a friend of mine was severely reprimanded for flying over an area which was not marked on his maps as being prohibited, yet those maps were only twelve months old. The only way to be sure of such things is to hire maps, which are regularly brought up to date, from the A.A. or the R.Ae.C. These, incidentally, are marked with track lines, magnetic bearings and distances in miles, so that there is a certain distinct advantage in hireage rather than purchase even if one's trips abroad are made fairly often.

And then, of course, there is the appalling camera question. Everybody who travels by airline on the Continent is used to being deprived of his camera before he steps into the machine. If travelling on private business in a private aeroplane you may find certain countries where nobody appears to mind very much so long as the officials have no reason to suspect you of espionage, and others where there is nothing on which to spy anyhow. But woe betide you if by accident of weather or plain forgetfulness you fly with an unsealed camera over central Europe.

For a person who is interested in photography these restrictions are very irritating indeed. Personally, my continual and so far unsatisfied wish is to take some really astounding picture of cloud formations and all the best ones seem to occur either when I am travelling in an airliner minus my camera or in a private machine with that sinister weapon duly sealed. Not for anything would I be bothered to take a picture of a dull stretch of ground in which there may or may not be a camouflaged aerodrome, or a bomb factory.

Nor are we free of such restrictions in this country, and a few months ago a very official notice about air photography was pinned up on all the club and airport notice boards. Professional photographers and those connected with journals must submit to the appropriate quarter every aerial photograph of docks, factories, aerodromes and so forth. Such (again) is the price of civilisation.

Bright Thought

A GOOD deal has been said and written about flaps from the days when people spoke of them almost solely as devices for reducing landing speed to the present day when, except in a few cases of special design, they are treated almost entirely in the light of their efficiency as approach steepeners—in other words, mechanisms by which a clean aeroplane can be made at will into a very dirty aeroplane.

One point, however, is not often mentioned or, apparently, considered as an outstanding reason for their value. Quite a number of machines, particularly those in the

(*Concluded at foot of next page.*)

Private Flying

THE RIGHT ATMOSPHERE

Country-Club-cum-Flying-Club at Pershore : The Worcestershire Flying School at Work

The aerodrome at Pershore, which the Worcestershire School operates.

"Flight" photograph.

SINCE even the attractions of flying, as flying, can be overrated when pilots must pay for them out of their own pockets, it behoves clubs to provide as many diversions as possible for those who cannot afford to spend much of their time in the air. While the club movement may or may not always remain comparatively stagnant, those who are interested in flying can usually be encouraged to support an organisation which is as much a country club as a flying club.

For several years now the Worcestershire Flying School has, under the management of Mr. R. J. Bunning, been providing a week-end-in-the-country atmosphere with flying for those who wish to learn. Although the School must necessarily obtain much of its support from the people in the immediate district, quite a large number of the 120-odd members

"Flight" photograph.

On the lawn outside Tilesford House, the School's club headquarters.

appear to come over either for the Sunday or for the week-end from Birmingham and the manufacturing districts of the Midlands. Obviously, there are other and larger clubs and schools in the Birmingham district, but it is always pleasant to be able to arrange a complete change and to follow rustic pursuits during non-flying intervals.

Furthermore, the advantages of being able to "live in" at Tilesford House, which is only a couple of hundred yards from the aerodrome itself, are obvious for those who are taking their flying training rather more seriously and who wish to concentrate on the work of obtaining "B" or instructor's licences. The clubhouse, which is looked after by Mrs. Bunning, is a sixteenth-century half-timbered house and there are half-a-dozen bedrooms as well as the usual recreation room, lounge and bar available for members—whether flying or otherwise. At the moment there are some sixty flying members.

The aerodrome at Pershore is large enough for all normal flying purposes—a couple of Walruses came in not long ago—and quite a number of pilots of different machines have used it when they have found that the clouds were sitting of the high ground toward Birmingham. Nevertheless, it is certainly not too large to provide good initial training, and any pilot who does his early flying there should be able to cope comfortably with most of the other aerodromes in this country. The field is actually rectangular, with a maximum run of 800 yards and a minimum of about 490 yards. Generally speaking, the approaches are excellent, and Mr. Bunning has the option on another field which, if taken in, would increase the maximum run to something well over a thousand yards.

The Fleet

The present fleet consists of a couple of Cirrus II Moths, but a third machine has usually been hired for the busier summer season. The rates are £2 for dual instruction and £1 10s. for solo flying, but the school receives a subsidy, and it has been possible to fix contract rates for all forms of instructional flying. A flat rate of £15, for instance, is charged for an "A" licence course, while an instructor's course costs £37 10s. and an inclusive "B" licence course £200. One of the school pupils, Mr. D. McCartney, is now an instructor for the Midland Aero Club at Castle Bromwich and Wolverhampton.

There is room in the hangar-cum-workshop for four folded Moths.

Mr. Bunning (who is addressed and alluded to as "Father" among the members) has been flying for something like seventeen years, and, after acting as instructor at two of the larger clubs in the country, finally decided to start his own club, which was opened in June, 1934. He is assisted in his secretarial labours by Mr. A. J. W. Frost.

Exactly what will happen now that Worcester has its own aerodrome remains to be seen. Possibly the municipality will invite Mr. Bunning to operate a club—and even a Reserve school—over there. That seems to be a logical possibility, and at least he can be depended upon to bring not only an enthusiastic group of members, but also the pleasant atmosphere of the Tilesford club.

Topics of the Day

(*Concluded from page 548d*)

transport class with comparatively high wing loadings, can have somewhat critical characteristics near the stall. Split flaps may or may not in certain cases improve the lateral control, but in any event they reduce the time during which the machine is flying near the ground at this critical speed.

Certain machines which have been looked upon by pilots as being rather difficult during the last phase of an approach have been entirely changed by the addition of flaps. No doubt the difficult characteristics remain, but they are, so to speak, only in force for such a short period of time that they are not noticed; before the machine has a chance of dropping a wing it has lost its flying speed and is running firmly along the ground.

INDICATOR.

Private Flying

FROM the CLUBS and SCHOOLS

HAMPSHIRE

THE Hampshire School put in 77-odd hours' flying during the week ended May 27. Mr. J. L. Gregory completed his "B" licence cross-country tests, and Mr. I. R. M. Cowie qualified for his "A" licence. Mr. E. Smail made a first solo.

BARTON (BEDS)

A record flying total was put up by Bedford School of Flying last week. Mr. J. D. Craig made his first solo. Social events for June include a summer dance to-night—the first to be held by this club—and a Dawn Patrol on the 12th.

HANWORTH

During last week Miss E. A. Robertson and Mr. Scott, of the Midland Bank Club, passed their "A" tests. The flying total was 89 hr. 25 min. Sir Derwent Hall Caine has added two more Swallows to his collection, and Mr. James Rush, the chairman of the club, is preparing his Tomtit for the Isle of Man races.

READING

The weather was kind enough to clear for the afternoon of Empire Air Day and between three and four thousand people gathered to see the display. Members of the club finished the day with an informal party. Mr. N. H. Townsend obtained his "A" licence during last week.

MARSHALL'S

Norwich, Barton, York and Hanworth were just a few of the terminals reached on cross-country flights by Marshall's Flying School, and in all 70 hours were spent in the air for the week ended May 22. In the following week the flying total was 60 hours and Messrs. Lee and Pirie each made a first solo.

STRATHTAY

For the week ended May 22 a total of 25 hours' flying was recorded. The club's Moth was delivered on Saturday, and there was a large turn-out of members, who were all anxious to play with the new toy. Mr. Charlton Halley, who went to Lympne for his "B" licence tests, returned the same day with the licence "in his pocket."

LONDON

For the week ended May 23, 95 hr. 25 min. was flown by the London Aeroplane Club members, and during the following week the flying total went up to 122 hr. 33 min. Messrs. T. Phelan and D. J. Mouchott made first solos and six new members joined the club in the fortnight.

BROOKLANDS

Final arrangements for the annual At Home on June 18 are now complete. Starting at 2.30 p.m. there will be a patrol on the orthodox lines, which will last until 3.15. A sealed arrival competition with a cash prize will also be held during this period, and will be followed by a display of the various types of aeroplanes present. Evolutions by a flight of Royal Air Force machines will follow. Last Sunday Mr. Ken Waller gave an aerobatic display, and next Sunday a height-judging competition will be held.

NORFOLK AND NORWICH

Gliding is proving quite a permanency at Norwich, and Miss W. F. Hudd has the distinction of being the first woman member to obtain her certificate. Mr. A. Kirkby is another successful licence-holder. A certain amount of power experience is helpful and gliding pupils are now required to have some small flying experience. In the power section, the holder of the scholarship issued by Mann and Egerton—Mr. V. Jones—has completed the tests for his "A" licence.

CINQUE PORTS

A particularly interesting list of new members includes Messrs. Geoffrey, John and Peter de Havilland, and Mr. Porteous, who only last week-end gave a demonstration of the Chilton monoplane. In spite of bad weather throughout most of the afternoon, Empire Air Day was enjoyed by considerable crowds who witnessed a display given by the R.A.F. at Lympne. A fly-past of civilian types of aircraft piloted by instructors and members of the club, and led by Capt. Percival in a new twin-engined Percival Q.6, was part of the programme. Joy-riding was also done by the Club. For the week a total of 45 hours was flown in spite of the continued bad weather. Capt. Neville Stack left Lympne last Thursday on the second stage of his flight to Turkey, after having been weather-bound there for nine days.

POWER SOARING

ALTHOUGH not very much has recently been heard of the various projects which Mr. R. Kronfeld has been working on during the last year or so, these projects are still very useful ones and there is a reasonable chance that at least one of them may come to fruition.

Now that so many people are interesting themselves in gliding, his scheme to provide aero-towed thermal soaring instruction from one of London's aerodromes is an interesting one. For this work he would naturally require a really modern and efficient two-seater sailplane, and he completed the plans for such a machine some time ago. The idea behind this project is concerned with the fact that so very many people, though keen enough on soaring and on making real flights in a sailplane, cannot always spare the time to travel out to one of the better-known gliding centres. Mr. Kronfeld, who originally became famous through his work as a soaring pilot—and was, in fact, one of the first of the Continental experts to demonstrate the real thing in this country—is quite convinced that it would be possible to carry out all the necessary instruction up to genuine solo soaring standard with the aid of a reasonably efficient two-seater.

Nowadays the aero-towing method is perfectly practicable and safe, and at Heston, for instance, where the scheme may possibly be put into action, Airwork have developed a special towing mechanism. Needless to say, with such a method of launching there is no limit to the height to which the sailplane may be taken, and by such means it is possible to book definite times for lessons on any day on which normal flying can be carried out. There will, consequently, be no waiting or waste of time. We should imagine that there would be very fair support for such a school, both among the novices and among those who have previously either done a little gliding or have learnt to fly a power machine and wish to try their hand at motorless flying as practised to-day.

The two-seater Drone on which Mr. Kronfeld was working until comparatively recently, and which still awaited a suitable engine, lies disregarded at Hanworth. His idea was to produce two types, one with a simple unit of about 30-40 h.p. and another with an engine of perhaps 80 h.p., giving the machine a performance which would make it in every way a useful means of transport. Although the two-seater Drone has to some extent departed from familiar Drone layout, it has similar characteristics as well as the special advantage that conventional dual instruction could be given in it.

Nevertheless, Mr. Kronfeld is still quite firmly convinced that it is both possible and practical to teach Drone pilots from, so to speak, the ground upwards. Something like half a dozen people with no previous flying experience have during the last year or so been trained up to solo standard with nothing more than verbal instruction and the practice obtainable with the ground trainer. Once the pupil has obtained a basic understanding of flying technique he can put in a few hours of practice in the Drone before, if he so wishes, going on to fully grown types. One pupil, who may have been exceptional, soloed on a Moth after one and a half hour's dual when his only previous experience had been that obtained on the ground trainer.

Although the somewhat superior pilot of full-powered aeroplanes may tend to despise the Drone when it is considered simply as a means of transport, this type of machine does still provide amusing flying at the lowest possible cost. There must be a very large number of young people whose only demand at the moment is to get into the air. Whether the device which they are flying travels over the ground at 50 m.p.h. or 150 m.p.h. is not of immediate consequence. For the moment, they just cannot afford to fly at 150 m.p.h.

FREE TRAINING

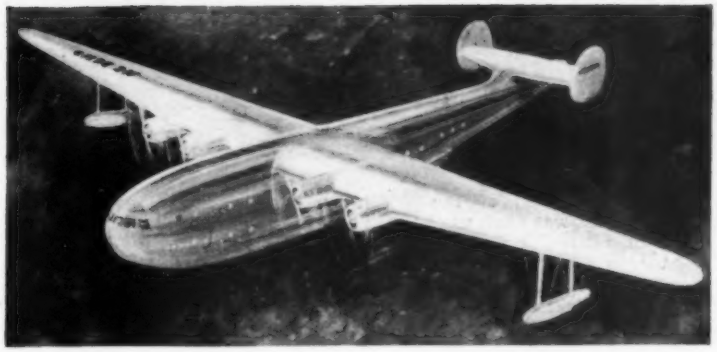
SINCE the Cinque Ports Club at Lympne assisted, in November last year, in the formation of the Youth of Britain Flying Training Association, six scholarship members have obtained their "A" licences. This Association was formed with the idea of providing suitable applicants with free flying training, and, provided that sufficient funds are forthcoming, the club hopes to be able to train at least twelve pilots every year.

The funds at the start of the scheme were calculated on a basis of a cost of £30 for each pilot, but the selection of the first six from nearly forty applicants was so well carried out that the costs have actually worked out at rather less than £23. One of them went solo after just over two hours' dual, and the other five soloed in a time which was well under average.

The selection system involves a trial flight for which the applicant pays, and depends partly on a preliminary technical examination and on the good thoughts expressed in an essay which each is required to write after the trial. The scholarship scheme was first introduced by Mr. A. E. Palmar.

A CHAT with GLENN MARTIN

Famous U.S. Constructor Over Here



Mr. Martin's next? A projected four-engined boat with a hull that is "easy on the wind tunnel."

THE achievements of Martin aircraft have been such as to lend great weight to the opinions and forecasts of Mr. Glenn L. Martin, president and general manager of the Glenn L. Martin Co., Md., who is visiting this country. Mr. Martin is both charming and earnest; he has tremendous faith in the future not only of his own products, but of long-distance commercial flying in general.

We tackled him on questions relating both to the mercantile and technical aspects. Transoceanic flying, Mr. Martin maintains, will be a job for flying boats the take-off of which, even without the various forms of "assists" which he has in mind, is not so critical as with landplanes. In any case, the aerodynamic characteristics of a flying boat of more than 100,000 lb. can be made better, he claims, than for a corresponding landplane. The Martin company has developed a hull which is not only "easy on the wind tunnel" (to quote Mr. Martin), but has excellent hydrodynamic qualities. Boats weighing 250,000 lb. are visualised and their salient characteristics have been planned, the new Martin assembly shed of 300ft. span having been designed with such developments in view.

Mr. Glenn Martin.

Detail design work on a projected four-engined landplane has been stopped, due, one supposes, to the strong competition which would be offered by the Douglas D.C.-4 and the Boeing Stratoliner, as well as to the need for concentration on marine aircraft.

On the subject of supercharged cabins Mr. Martin is particularly well informed, for his company has spent thousands of pounds in development work. He told of an experiment made by his project engineer and officials of the American Bureau of Standards in the "high altitude" chamber to determine what would happen to the passengers in one of these cabins were a window to "blow" at 25,000ft. The pioneers experienced no immediate shock on being immersed in rarified air, and the experiment provided sufficient data to determine how much oxygen need be added to the system to keep the passengers in a reasonable degree of comfort pending the replacement of the window.

Another subject dear to the heart of Mr. Martin is the employment of scale flying models instead of expensive prototypes. When the U.S. Navy wanted a new type of patrol bomber one of these models was quickly prepared at very little expense and powered with a four-cylinder engine mounted centrally and driving two airscrews, set in front of scale model radials, by means of belts. The initial tests were very promising and research is still proceeding in spite of a temporary setback when a belt broke and tore round inside the wing looking for a way out. The model represents a gull-winged machine (not unlike our Short Knuckleduster, which was rather down on performance, due to the fact that the inner sections of the wings were virtually stalled in level flight), with corrugations in the upper hull plating. It is soon to be sent to Langley Field for tests in the full-scale tunnel; comparisons will be made with the results obtained in flight. Twenty-two examples of the full-scale machine have been ordered by the U.S. Navy.

The successful Martin twin-engined landplane bomber has been brought right up to date by the fitting of the latest Twin Wasps or Cyclones released for export. This model, the 166, is now in production and has the following characteristics: Top speed (Twin Wasps), 255 m.p.h.; service ceiling, 24,800ft.; cruising range, 2,000 miles; weight empty, 10,592 lb.; gross weight, 15,894 lb.

In more altruistic vein, Mr. Martin expressed the view that there is no reason why Great Britain should not get Pacific rights at Hawaii. At present, of course, we are working on our own and are planning an All-Red service with Trans-Canada Airlines as the overland link. According to Mr. Martin, if the cargo and passengers could be shared with American lines, America would, so to speak, "cut us in" on the Pacific route.

The big American shipping companies are becoming very seriously interested in flying-boat services and one is considering the purchase of some Martin 157s (developed from the 156 as supplied to Russia, but having detail improvements and being strengthened for an all-up weight of 70,000 lb.) for opening up its routes.

Difficulties with the ice at New York, explained Mr. Martin, will probably result in the final establishment of the U.S. Atlantic base at Baltimore.

THE SIXTEENTH PARIS AERO SHOW

THE closing date for applications for stands at the Sixteenth International Aero Exhibition, to be held in Paris next November, was May 15 last, and the ballot for position will take place on June 15.

British manufacturers will be well represented by Bristol, Hawker (showing the Hurricane) and Blackburn and—in the engine section—by the Rolls-Royce, Bristol Armstrong Siddeley, Napier and De Havilland Companies. France will show several new types now under construction in the factories of the six nationalised companies.

Among the French engines it is hoped that the new Marcel Bloch unit will be shown and that the new Alsthom Co., licencees of Bristol engines, will have a stand. Gnôme-Rhône and Hispano-Suiza will, of course, be represented.

Germany is participating this year and, besides machines from the Junkers, Heinkel and Focke Wulf firms, the Messerschmitt monoplane, holder of the world's international landplane speed record, has been promised as an attraction.

American machines will be represented by models on the stands of European representatives, and Curtiss Wright will be showing examples of their engines.

Among other well-known names familiar at Paris shows will be Fokker, Walter, Koolhoven and P.Z.L., while several new names will figure among the air transport companies.

During the period of the Exhibition an Airline Congress is to be held at the Aero Club of France from November 30 to December 3 and a Geographical Aviation Congress is to take place from November 21 to 26.

AIRCRAFT MATERIALS

Professor H. J. Gough, M.B.E., D.Sc., M.I.M.E., F.R.S., Reviews Present Position and Calls Attention to Useful Fields for Research

THE lecture hall of the Institution of Mechanical Engineers was filled to capacity last Thursday when Prof. H. J. Gough, of the National Physical Laboratory, read the twenty-sixth Wilbur Wright lecture before the Royal Aeronautical Society. Mr. Handley Page was in the chair, and apologised to the lecturer for having to embarrass him by giving an outline of his career. The achievements enumerated by Mr. Handley Page were indeed such that they might well embarrass the lecturer, but they did give the audience an indication of the very remarkable qualifications of the man to whom they were going to listen.

Prof. Gough pointed out that a relatively few years had seen the relinquishment of the position held by steel as a structural material. The use of light alloys had become very general, and an improved form of wood was definitely in the field, so it might be that the entire structure of moulded plastics would become a practical proposition in the fairly near future. Development by the engine builder was retarded to some extent by the fact that a number of materials appeared to have reached the visible peak of their development, and new materials were urgently required. It might be that the airscrew of the future 2,000 to 4,000 h.p. engine would be made of materials other than metal, although the present aluminium alloy propellers had given such good performance.

Historical Review

Prof. Gough divided his paper into five parts, of which the first dealt with the developments which had taken place in the period 1903 to 1938, that is, from the first flight of the Wright Brothers in 1903 to the present time. In part two he discussed briefly some of the typical features of representative British aircraft of 1938. Part three was a summarised technical survey of the principal aircraft materials available—steels, light alloys, special alloys, wood, plastics and rubber. Part four was a discussion of the materials in their relation to the purpose for which they were used in aircraft and engines, and part five dealt with some specially interesting characteristics of metals. The paper, with illustrations, occupied 114 pages of the size of the Royal Aeronautical Society's journal, so that obviously we shall have room for only the briefest outline of the main points raised.

The lecturer gave the best estimate he could of the materials used by the Wright Brothers in the engine used in the machine which made the first flight on December 17, 1903. He had been helped to a certain extent by Mr. Orville Wright, but most of the information had been obtained by referring to contemporary technical publications and discovering from them which materials were in current use at that time. The lecturer then assumed that, as the Wright Brothers had no special materials ordered for their engines, they were using those available at the time. He suggested, however, that as a matter of historical interest the engine should be dissembled and an exact determination made of the materials used. Using micro-chemical methods, the damage caused would be negligible.

Part two of the lecture dealt with some typical aircraft and engines of 1938. As, however, it is to be assumed that these will be familiar to readers of *Flight*, we shall not devote space to this section of the paper beyond giving, in table II, a general analysis of the materials used in regard to broad classification and principal sub-divisions within each class of engines. The lecturer pointed out that an analysis of this type had not previously been published, so far as he knew, and, taken in conjunction with the table of data for the Wright engines, the table showed in vivid contrast the development that has taken place in the nature and number of engine materials used during the last thirty-five years. Reduced to an even broader type of classification, the materials of these engines on a weight basis showed the following percentages:—

	A	B	C
Ferrous Metals	42%	48%	48.1%
Non-Ferrous Alloys, Light ...	53.5%	47%	48.3%
Non-Ferrous Alloys, Heavy ...	4%	4.7%	3.4%
Non-Metallic Materials	0.5%	0.3%	0.2%

Crankshaft, connecting rods, valves and gears might, the lecturer stated, be used as typical illustrations of the constant efforts made to devise improved materials to meet increasing severity conditions. Table III indicates the changes that have taken place during the last thirty years in the materials used for these components.

Noteworthy Component

The supercharger impeller was a noteworthy component, as it might have to revolve at 24,000 r.p.m. Sometimes it was made of 55-ton nickel-chromium steel, while in other cases successful use had been made of a 27-ton high-grade wrought aluminium alloy.

Part three of Prof. Gough's paper, which related to a survey of materials used at the present time, is of extraordinary interest to engineers, but this section of the lecture cannot usefully be summarised, and we must refer readers who wish to study it in detail to obtain a copy of the paper from the Secretary of the Royal Aeronautical Society.

TABLE II.

A GENERAL ANALYSIS OF THE MATERIALS USED IN THREE MODERN AERO ENGINES.

General Classification.	Type.	ENGINE A (Radial Air-Cooled).			ENGINE B (In-line, Liquid-Cooled).			ENGINE C (In-line, Air-Cooled).		
		Number of Materials.	Weight, lb.	% of Total Weight of Engine.	Number of Materials.	Weight, lb.	% of Total Weight of Engine.	Number of Materials.	Weight, lb.	% of Total Weight of Engine.
Ferrous Metals.	Cast Iron	2	5	0.5	—	—	—	2	2	0.1
	Carbon Steels	9	30	3.0	3	114.5	9.6	20	212	18.2
	Low Alloy Steels—									
	(a) Nickel	1	60		3	185		2	14	27.6
	(b) Nickel-Chromium ...	5	180		2	123.5		6	308	
	(c) Chromium	—	—	29.0	1	9	35.6			
	(d) Chrom.-Molybdenum ...	1	50		1	92.5				
	(e) Chrom.-Vanadium ...	—	—		1	13				
	High Alloy Steels—									
	(a) Chromium	3	5	9.5	2	9	2.8	10	10	2.2
	(b) Nickel-Chromium ...	1	90		2	24.5		2	15	
Non-Ferrous Metals.	Aluminium Alloys—									
	(a) Castings	3	200	50.3	1	440	47	4	221	33.7
	(b) Forgings, etc. ...	6	303		5	114.5		16	172	
	Magnesium Alloys—									
	(a) Castings	3	31	3.2	—	—	—	1	168	14.6
	(b) Forgings, etc.	1	1					1	2	
	Copper...	1	3	0.3	1	9	0.7	2	1	3.4
	Brass	4	7	0.7	1	4.5	0.3	10	7	
	Bronze	4	30	3.0	3	44	3.7	12	32	
Non-Metallic.	Rubber, Bakelite, etc. ...	—	5	0.5	—	3	0.3	8	3	0.2
	Totals ..	44	1,000	100	27	1,186	100	96	1,167	100

The lecturer expressed the opinion that probably the most important problems in connection with engine development related to pistons, bearings, valves and valve gear. On their satisfactory solutions future increases in engine ratings would depend to a considerable extent.

Pistons of the present aero engines in production were exclusively of aluminium alloys, chiefly of R.R.59 or "Y" alloys. Much attention was being given to the experimental development of magnesium alloy pistons, and satisfactory pistons of this type might be evolved in the future. The lecturer thought that the aluminium alloy piston was at the peak of development for the air-cooled type of engine. Present improvements in aluminium alloy pistons chiefly took the form of a design aimed at a better heat flow.

White metal bearings were at one time universally employed. Although still employed to a certain extent at the present time, they were being superseded by lead-bronze bearings in a large number of engines. When carefully made, lead-bronze bearings gave satisfactory performance in present engines, but the search for other materials was being vigorously pursued, and the paper refers to research carried out by Mr. Devereux of High Duty Alloys which has resulted in the production of an alloy containing approximately 90 per cent. aluminium, with additions of Sn., Sb., Ni., Mu., and Si., from which Mr. Devereux expected great things. In America experiments were being made with bearings made of high-purity silver. Laboratory tests had shown that these silver bearings exhibited marked resistance to fatigue combined with rather remarkable freedom from seizing. Bearing pressures up to 5,000 lb. per sq. in. and rubbing velocities of 2,500 ft. per min. were now being reached, and further increases might be regarded as certain, provided that satisfactory bearing materials were developed. Lead-bronze bearings would not meet the demands of the future, and a most useful field for research was evident.

Severe Requirements

The poppet valves in present use represented a most remarkable metallurgical development designed to withstand extreme severity of operating conditions at high temperatures and exposure to the corrosive action of leaded fuels, combined with the need for cooling by heat transference. The present answer was the hollow sodium-cooled valve made of austenitic steel. The poppet valve was fairly satisfactory for present engines, but it seemed likely that future direction of valve development for higher-powered engines, particularly of the air-cooled type, would tend more and more to the sleeve-valve.

Crankshaft design could be said to be controlled chiefly by considerations of the permissible bearing pressures. In the case of in-line engines, dimensions of crankshafts were fixed by considerations of stiffness rather than strength. The paper discloses the interesting fact that crankcase failures in service are practically unknown, and that it is necessary to resort to tests under high overload conditions to reveal that the weakest part of the shaft is at regions subject to stress-concentrations.

The lecturer pointed out that connecting rods, being highly stressed components, had in the past given much trouble during the course of their development, but that completely satisfactory designs had now been obtained. The service demanded of a master rod was indeed severe, and for connecting rods of future engines of higher power a 150-ton steel was required. Such a steel was now available.

As in the case of bearings, the severity of operating conditions of gears had increased greatly in recent years. The material generally used for highly-stressed gears was a nickel-chromium case-hardening steel. Recent developments referred more to design than to improved materials. The ability of the surface of a tooth to carry high loadings depended greatly on the lubricating conditions, and the lecturer recalled an experiment carried out on an aero engine reduction gear. After two hours' running with a mineral oil the signs of a breakdown of the tooth surface were evident. The mineral oil was then removed and castor oil substituted. After a short run the gear had again acquired a polished surface. The cycle was repeated over and over, and the "healing-up" and deterioration of the surface were repeated each time, showing the relative lubricating values of each oil under working conditions.

For engines up to a certain power, crankcases were, the lecturer pointed out, made of two magnesium alloys containing 8½ per cent. aluminium and 3½ per cent. zinc. Crankcases made of this material suffered from the inherent disadvantage of a low modulus of elasticity. If sufficient material was used to give the necessary stiffness, the saving in weight tended to disappear. The other disadvantage was corrodibility. For engines of higher power a change to an aluminium alloy was made. The aluminium alloys used for crankcases were either forged (R.R. 56 type) or cast (R.R. 50 type). In both cases there was a demand for an improved material having a greater resistance to creep at temperatures of about 150 deg. C.

Difficulties had occurred owing to the cracking of large cylinder-head castings of in-line air-cooled engines. The trouble had been got over by design, but there was need for improved aluminium alloys possessing increased resistance to fatigue and creep at high temperatures.

Need for Damping

The impeller of a supercharger was exposed to severe stressing conditions. A normal speed of 24,000 r.p.m. might subject the blades to nominal direct stresses of 14 tons per sq. in. or more. There were, however, other stresses such as flutter and vibration, and the failures that had occurred were principally due to this cause. At the present time impellers were made either of steel or aluminium alloy. Development in steel began with a 65-ton nickel-chromium steel which was superseded by a 100-ton air-hardening steel which, however, proved too hard, and had now been displaced by a 70-ton five per cent. nickel steel. In other engines successful use had been made of R.R. 56 aluminium alloys. The need for lighter materials still existed, and stampings of magnesium alloys were being used for experimental and development purposes. Although the drive for impellers was designed to be highly elastic, the property of damping capacity in the material itself was desirable. The exhaust-driven supercharger would introduce additional problems, and the temperature of the gases would be about 700 to 750 deg. C. When operating at speeds up to 35,000 r.p.m. a satisfactory material would be required to withstand centrifugal stresses of 60 tons per sq. in. at 700 deg. C. A steel having a high creep strength allied with resistance to scaling and corrosive attack by the exhaust gases was required, and experiments on this problem were in hand.

Much useful development was to be expected in the future in the direction of flexible transmission couplings between engine and airscrew whereby the airscrew would be virtually isolated from engine vibration. One might also expect the increasing use of flexible engine mountings to isolate the aircraft structure from the engine vibration. For this purpose the use of bonded rubber appeared promising. In the automobile field much had been accomplished in the matter of crankshaft dampers, but the application to aircraft was at present only in the experimental stage. Several types of damper were in course of development in which rubber was used chiefly in compression or shear or a combination of the two. Similar principles were used in the design of engine mountings. Whereas flexible engine couplings had not been fitted to production engines in this country, engine mountings for radial and in-line engines had already found limited use.

(To be concluded next week.)

TABLE III.

APPROXIMATE SEQUENCE OF CHANGES, DURING THE PAST 30 YEARS, IN THE MATERIALS USED FOR FOUR IMPORTANT ENGINE COMPONENTS.

Name or Specification.	Typical Composition.	Approximate Tensile Strength (tons sq. in.).
	CRANKSHAFT.	
—	0.45 C., 0.6 Mn.	35–40
—	0.7 C., 0.3 Mn.	45–60
KE 805	Nickel Chromium Steel	60–70
B.S.S. 11	0.3 C., 3.0 Ni., 0.75 Cr.	55–65
DTD 228	0.3 C., 1.0 Cr., 1.0 Mo. (Nitrided)	55–65
DTD 306	0.25 C., 3.0 Cr., 0.5 Mo. (Nitrided)	60–70
	CONNECTING RODS.	
—	0.45 C., 0.6 Mn.	35–40
—	0.7 C., 0.3 Mn.	45–55
KE 805	Nickel Chromium Steel	60–70
B.S.S. 65	0.25 C., 3.0 Ni., 1.2 Cr.	65–70
B.N.D.	0.3 C., 4.0 Ni., 1.25 Cr.	105 (min.)
	VALVES.*	
—	Malleable Cast Iron	—
Composite	Cast Iron Head and 3% Ni. Steel Stem	—
Nickel-Chrome	3.0 Ni., 0.5 Cr., 0.35 C.	5.2
5% Nickel	5.0 Ni., 0.3 Cr., 0.12 C.	5.5
High Speed Steel	14.7 W., 3.4 Cr., 0.55 C., 0.5 Va.	8.7
Stainless Steel	13 Cr., 0.3 C.	6.0 at 800 °C.
Cobalt Chrome	13 Cr., 1.0 Ni., 5.0 Co., 1.5 C.	10.0
Silicon-Chrome	9 Cr., 4 Si., 0.45 C.	7.0
DTD 49 B	13 Cr. 13 Ni., 2.5 W., 0.4 C. 1 Si.	20.0
	GEARS.	
Case-hardening MS	0.15 C., 0.6 Mn.	35–45
KE 805	Nickel Chromium Steel	80–90
3% Ni. Case-hardening Steel	3 Ni., 0.12 C.	45–60
5% Ni. Case-hardening Steel	5 Ni., 0.12 C.	70–85
Ni-Cr. Case-hardening Steel	4.25 Ni., 1.3 Cr., 0.12 C.	85–95

* Improvements in corrosion-resistance and strength at elevated temperatures.

SERVICE AVIATION

Royal Air Force and Air Arm News: *Official Announcements : Fleet Military Aviation Abroad*

The French Mission

GENERAL J. VUILLEMIN, Chief of the French Air Staff, and a party of officers of the French Air Force arrived in London on Sunday for a six-day visit. Their trip is the outcome of an invitation extended to the French Air Force a considerable time ago. Arrangements have been made for the party to visit several R.A.F. stations and one aircraft factory. They saw the Northolt Hurricanes last Monday.

A Range at Crichel Down

A PRACTICE bombing range is to be established at Crichel Down, Dorset. The site has been chosen (after careful examination of other possible locations in the same area) as being one which will cause the minimum of interference with local amenities.

Back from Down Under

THE five Saro London flying boats of No. 204 (General Reconnaissance) Squadron arrived back at Mount Batten on Sunday from their Australian cruise. They have flown approximately 30,000 miles and have been in the air for about 400 hours. The first to touch down bore Wing Cdr. Feather and Sqn. Ldr. Lloyd.

New Squadrons Forming

NO. 85 (Fighter) Squadron formed at Debden on June 1, on which date the unit was placed in the Fighter Command in No. 11 (Fighter) Group.

Nos. 106 (B) and 185 (B) Squadrons formed at Abingdon on June 1, and was placed in the Bomber Command in No. 1 (Bomber) Group.

The R.A.F. in Ceylon

A NEW R.A.F. station is to be established at Trincomalee, on the west coast of Ceylon. The position is obviously of strategic importance, providing a half-way house on the sea route between Aden and Singapore. Between them, Ceylon and Singapore are the two aerial gateposts at the entrance to the Bay of Bengal, and would obviously circumscribe the activity of any future raider like the *Emden*.

Air Defence in India

AIR attacks on Indian ports are hardly an imminent danger, so long as the Royal Navy continues to command the seas. For this reason the Indian Government, always impecunious, has refrained from incurring the expense of a reserve of pilots for air defence. Now, however, it is believed in certain quarters that the Government is considering coming to some arrangement with the flying clubs, whereby a reserve of pilots may be brought into being. The Government has so far refused to make any statement.

Royal Air Force Garden Party

A ROYAL AIR FORCE Garden Party will be held on Saturday, July 2, at Trent Park (Cockfosters), which has been lent by Sir Philip Sassoon. The party is the first event of its kind to be held by the Royal Air Force and will provide an opportunity, particularly for those home from overseas, for a general meeting of officers and their families which formerly was afforded by the Hendon Display. A Ladies' Committee has been formed to help the organisation.

All officers, past and present, of the Royal Air Force, the Auxiliary Air Force and the Royal Air Force Reserve and Women's Royal Air Force are invited (with their wives, and sons and daughters over 16 years of age), and members of Princess Mary's Royal Air Force Nursing Service. An invitation is also extended to civilians of officer status employed under the Air Ministry throughout the country, and widows of officers formerly connected with the Service.

A limited number of guest tickets is available. Tickets for the Garden Party are 5s., or, if applied for after June 25, 7s. 6d. Application should be made either to Station Headquarters or to the Under-Secretary of State, Adastral House, Air Ministry (S.7 (d)), Kingsway, W.C.2, with remittances. Cheques should be crossed and made payable to the Royal Air Force Garden Party.

The Central Band of the Royal Air Force will play during the afternoon by permission of the Air Council.

The New "Thirty-eight"

THE Colt .455in. automatic, or, more strictly, self-loading pistol, which for years has been standard issue for officers, is gradually being replaced by a revolver of post-war design and smaller calibre (.38in.), essentially similar to the .455 Mark VI Webley, which has also been used in the Service.

The decision to adopt the new weapon was probably made for a variety of reasons. The automatic is of necessity more delicate than the revolver and its action is liable to be affected by sand; the Colt is of American manufacture and was adapted to take British ammunition, suffering somewhat in consequence (like the Browning machine gun); and there has been a growing feeling that the .455 is unnecessarily heavy for the personal use of officers, though its shocking, or stopping, power as compared with weapons of smaller calibre has for long been undisputed.

It is claimed for the new revolver that its stopping power is practically equal to that of the older and heavier models. The double action is smooth and the butt is well shaped. Its disadvantages are, as with all revolvers, comparative slowness of loading and inconvenience in carrying ammunition.

The Short Sunderland

AT least five Short Sunderland flying boats (see pictures in this issue) have been completed and have been seen by the public. The Sunderland represents the new class of four-engined, long-range patrol, reconnaissance and bombing machines now being developed by the major powers, but whereas other countries designed their new prototypes, so to speak, from scratch, Short Bros. were able to develop the Sunderland from the well-tried Empire boat, although, as will be gathered from the illustrations, there are several differences.

The hull bottom of the Sunderland departs from Empire boat practice chiefly in the design of the steps; the front step is cut at an angle and the rear one tapers to a sharp point. Though detailed dimensions are not available, the hull seems even deeper than that of the civil machine; the fin and rudder area also seems larger and the surfaces have been redesigned.

Power-driven gun turrets are installed in the bows and stern (the front one slides to permit mooring operations) and the pilots' cabin is much farther aft than in the Empire boat. Aft of the wing, on top of the hull, are marks which may or may not signify the presence of additional armament. Wing and float design seem basically unchanged

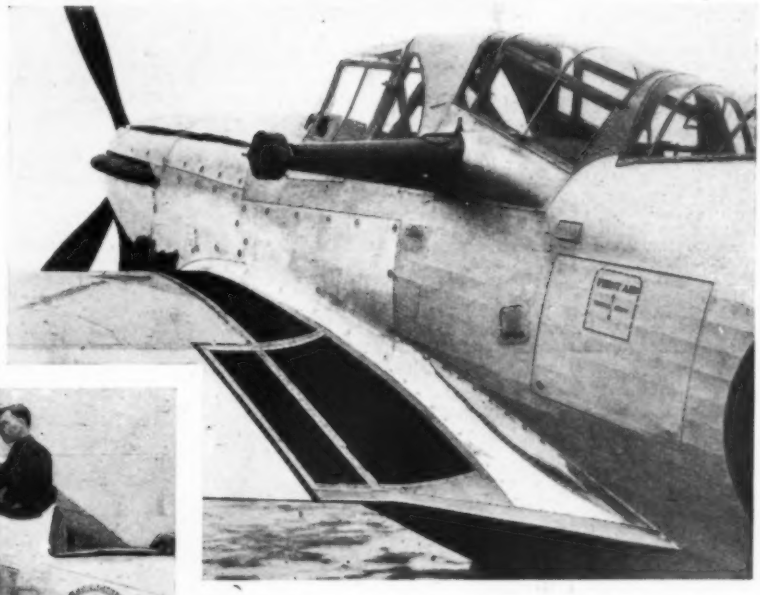
The four Pegasus engines are sharply staggered and have the characteristic Bristol combined exhaust-collector (with single outlet) and cooling gills. As Service flying boats are normally powered with moderately supercharged engines it is likely that the Sunderland's engines are of the new Pegasus XXII series, which have the following ratings: Take-off at maximum r.p.m., 1,010 h.p.; international rated power, 810-850 h.p. at 4,000ft.; maximum power for all-out level flight, 915 h.p. at 6,250ft. The Pegasus XXII is adaptable for the use of a constant-speed airscrew.

Felixstowe seems tremendously pleased with the new boat; some aspects of its performance may frequently be studied from Rochester bridge.

"*Flight*" photograph.

PROBOSCIDAL MODS.: The new nose of the Handley Page Hampden bomber (two Pegasus) as now in quantity production. Deliveries will start very shortly. Note the dihedral on the wings and the revised gun positions.

HAWKERS —WITH DIFFER-ENCES



The two upper views show the Hawker Henley bomber as modified for high-speed target towing. Armament Training Stations will shortly be issued with these machines The engine is a Merlin. The lower view shows the modification of a Hawker Hind for high-speed parachute dropping at Henlow. Speeds of about 320 m.p.h are attained before release of the dummy. A static line is fitted to ensure clearing the structure. This Hind gave a demonstration on Empire Air Day.

Essay Topics

THE subject of the Gordon Shephard Memorial Prize Essay for 1938-39 is: "It has frequently been suggested that bombing attack is best met by fighter aircraft and gun defence, and not by counter-bombing. Discuss the practicability of this suggestion with regard to the air defence of Great Britain, and deduce what you consider to be the most satisfactory constitution and employment of the Metropolitan Air Force."

For the Bertrand Stewart Prize Essay the subject is: "Our national characteristics are more favourable to a process of evolution than to revolutionary changes. Evolution towards closer co-ordination between the three services in peace and closer co-operation in war has made appreciable progress since 1918.

"Trace the progress of these developments up to date and discuss what should be the goal at which evolution should aim and by what steps this goal should be approached."

Royal Air Force Gazette

General Duties Branch

The following F/O.s are promoted to the rank of Flt. Lt. on the dates stated:—

D. F. Balsdon (March 6); D. F. Macdonald (March 29).

The following F/O.s are granted the acting rank of Flt. Lt. on the dates stated:—

W. E. Surplice (March 14). A. D. Groom (March 24); T. G. Tideman (April 14).

Group Capt. H. Gordon-Dean, A.F.C., is placed on the retired list at his own request (May 16).

Flt. Lt. I. A. Scott is transferred to the Reserve, Class B (May 12).

Flt. Lt. J. F. Hobler is granted a permanent commission in that rank (February 21).

The following F/O.s are promoted to the rank of Flt. Lt. on the dates stated:—D. M. H. Craven (seniority January 1) (April 1); R. G. Slade, J. M. Southwell (May 7).

Cdr. J. I. Robertson, R.N., Sqn. Ldr., R.A.F., ceases to be attached to the R.A.F. on return to Naval duty (February 4); Sqn. Ldr. C. Chapman, D.S.C., is placed on the retired list at his own request (May 16).

Equipment Branch

The following F/O.s are promoted to the rank of Flt. Lt. (April 19):—G. G. N. Marshall, M.B.E., W. Macey.

F/O. P. G. Bullen is granted the acting rank of Flt. Lt. (May 1).

The following are granted commissions as Flt. Lts. on the dates stated:—Major T. Calcott, M.B.E. (I.A., Ret.) (April 4); Flt. Lt. L. F. Caunter (R.A.F.O.) (April 13).

Auxiliary Air Force

General Duties Branch

Flt. Lt. A. W. Shaw (R.A.F.O.) is granted a commission in that rank (March 28); Flt. Lt. F. T. Stacey (R.A.F.O.) is granted a commission in that rank (March 31); Sqn. Ldr. H. C. Fuller (late R.A.F.) is granted a commission as Flt. Lt. (Honorary Sqn. Ldr.) (April 4).

Service Aviation

No. 901 (COUNTY OF LONDON) (BALLOON) SQUADRON.—Maj. J. S. Wheelwright, D.S.C., is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

No. 902 (COUNTY OF LONDON) (BALLOON) SQUADRON.—Lt. Col. J. J. O'Hea (T.A.R.O.) is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

No. 903 (COUNTY OF LONDON) (BALLOON) SQUADRON.—Maj. G. M. Haslam, T.D. (T.A.) is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

No. 904 (COUNTY OF SURREY) (BALLOON) SQUADRON.—Maj. E. J. Davis (late T.F.R.) is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

No. 907 (COUNTY OF MIDDLESEX) (BALLOON) SQUADRON.—Capt. G. Aste is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

No. 909 (COUNTY OF ESSEX) (BALLOON) SQUADRON.—D. A. J. Buxton is granted a commission as Sqn. Ldr. and appointed to the command of the squadron (May 16).

Medical Branch

No. 614 (COUNTY OF GLAMORGAN) (A.C.) SQUADRON.—I. R. Jones, M.R.C.S., L.R.C.P., is granted a commission as Flt. Lt. (April 13).

Capt. S. L. Delanay (R.A.R.O.) is granted a commission as Flt. Lt. in Class C (April 7); F/O. G. C. B. Bernard-Smith is promoted to the rank of Flt. Lt. (October 5, 1937); F/O. G. D. Fleming is promoted to the rank of Flt. Lt. with effect from May 10 and with seniority of April 25, 1937; Flt. Lt. A. M. Dickeson Howes is transferred from Class A to Class C (May 8); Lt. Cdr. W. A. Lindsay-Watson (R.N., Ret.) is granted a commission as Flt. Lt. in Class C with effect from April 1.

Flt. Lt. W. R. Cox is transferred from Class A to Class C (May 2).

Royal Air Force Appointments

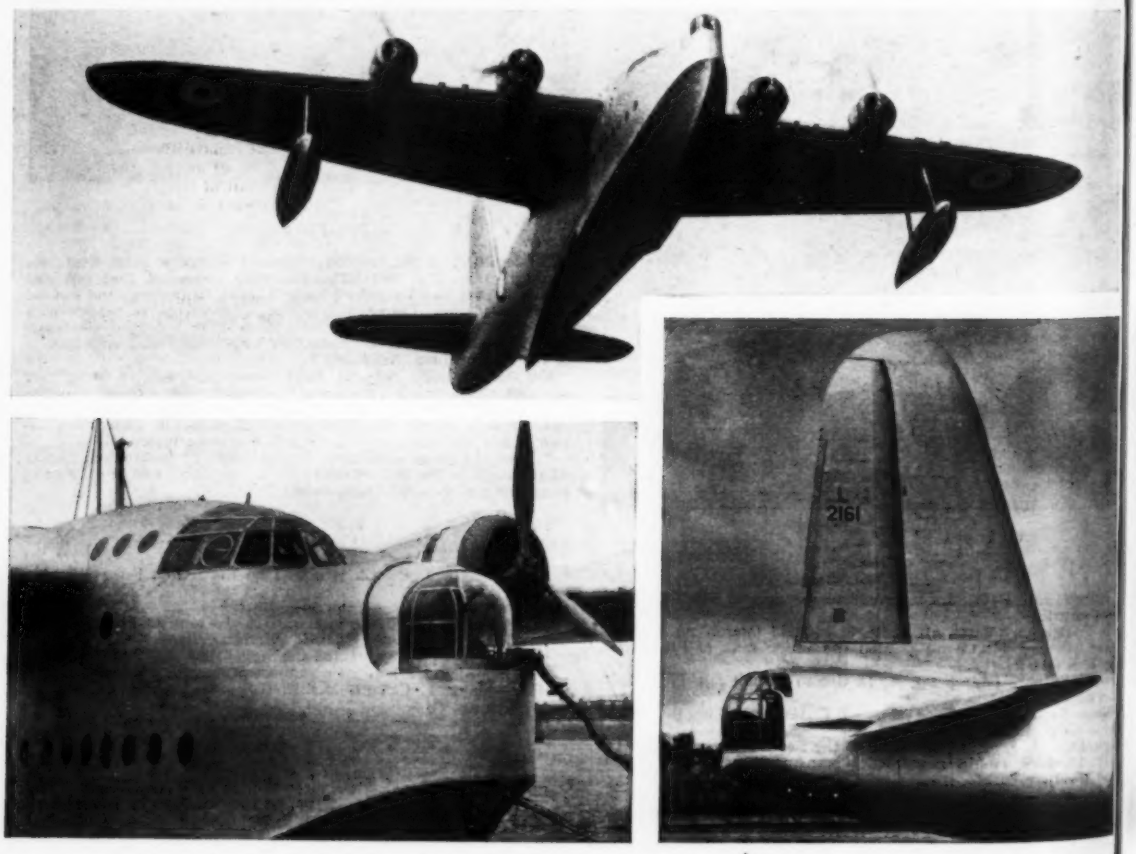
General Duties Branch

Group Captains.—E. O. Grenfell, M.C., D.F.C., A.F.C., to R.A.F. Station, Thornaby; to command, 12.5.38. F. H. Coleman, D.S.O., to R.A.F. Station, Mildenhall; to command, 5.5.38.

Wing Commanders.—C. E. H. James, M.C., to H.Q., R.A.F., Middle East, Cairo, for duty as Senior Personnel Staff Officer, 1.5.38. B. Ankers, D.C.M., to No. 2 (Indian Wing) Station, Risalpur, India; to command, 25.4.38. H. S. Broughall, M.C., D.F.C., to No. 70 (B.T.) Sqn., Habbaniya, Iraq; to command, 23.4.38. G. S. Oddie, D.F.C., A.F.C., to R.A.F. Station, Boscombe Down; to command, 29.4.38. J. Potter, to No. 58 (B.) Sqn., Linton-upon-Ouse; to command, 29.4.38. F. Beaumont, to No. 1 A.A.C. Unit, South Farnborough; to command, 2.5.38.

Squadron Leaders.—W. H. Poole, A.F.C., M.M., No. 6 A.T.S., Woodsford; to command, 6.5.38. D. S. Brookes, to H.Q., Coastal Command, Lee-on-the-Solent; for Engineer duties with H.M.S. *Ark Royal*, 2.5.38. F. M. Denny, to School of Air Navigation, Manston; for Flying duties, 2.5.38. G. E. Sampson, to No. 74 (F.) Sqn., Hornchurch; to command, 2.5.38. C. D. Adams, to H.Q., Bomber Command; for Air Staff (Operations and Training duties), 12.5.38. A. F. Hutton, to R.A.F. Station, Odiham; for Air Staff duties, 5.5.38. J. G. Llewelyn, to No. 15 (B.) Sqn., Abingdon; to command, 12.5.38. G. R. C. Paul, to No. 90 (B.) Sqn., Bicester; to command, 9.5.38. D. H. F. Barnett, to No. 84 (B.) Sqn., Shaibah, Iraq; to command, 14.4.38. G. Bearne, to H.Q., R.A.F., Iraq, Habbaniya; for Armament duties, 13.3.38. C. V. Howes, to H.Q., R.A.F., Palestine and Transjordan, Jerusalem; for duty as Senior Equipment Engineer Officer, 13.4.38. A. G. Adnams, to No. 6 (B.) Sqn., Ismailia, Egypt; to command, 18.4.38. E. D. Barnes, A.F.C., to No. 3 (Indian) Wing H.Q., Chaklala, India; to command, 25.4.38. S. R. Ubee, to No. 1 (Indian) Group, H.Q., Peshawar, India; for Air Staff duties, 25.4.38. C. B. Hughes, to No. 60 (B.) Sqn., Kohat, India; to command, 23.4.38. R. W. G. Lywood, to No. 12 (B.) Sqn., Andover; to command, 16.5.38. A. F. Britton, to No. 1 A.A.C. Unit, South Farnborough; for flying duties at Flimston Practice Camp, 16.5.38. D. P. Lascelles, to No. 104 (B.) Sqn., Bassingborn; to command, 11.4.38. M. V. Ridgeway, to No. 22 (T.B.) Sqn., Thorney Island; to command, 30.4.38. W. E. G. Mann, D.F.C., to R.A.F. Station, Ismailia, Egypt; to command, 22.4.38. J. H. McC. Reynolds, to No. 33 (F.) Sqn., Ismailia, Egypt; to command, 22.4.38.

Flight Lieutenants.—C. Charlton-Jones, to No. 822 (T.S.R.) Sqn., 5.5.38. I. A. Critchley, to No. 11 F.T.S., Wittering, 2.5.38. W. R. Farley, to No. 1 F.T.S., Leuchars, 2.5.38. B. H. Boon, P. D. W. Hackforth, J. E. Kirk, D. Saward, T. R. Vickers, to Electrical and Wireless School, Cranwell, 24.4.38. R. M. Hall, to No. 903 (B.B.) Sqn., Kidbrooke, 16.5.38. D. P. Lee, to No. 907 (B.B.) Sqn., Stanmore, 16.5.38. L. J. Neale, to No. 213 (F.) Sqn., Wittering, 16.5.38. C. Stephenson, No. 27 (B.) Sqn., Kohat, India; to command, 25.4.38. D. J. Alvey, to No. 8 F.T.S., Montrose, 19.4.38. L. B. B. King, to School of Air Navigation, Manston, 9.5.38. J. G. MacIntyre, to C.F.S., Upavon, 19.4.38. R. F. Smith, to No. 18 (B.) Sqn., Upper Heyford, 22.4.38. D. M. Somerville, to H.Q., No. 26 (T.) Group, Hendon, 21.4.38. E. M. Withy, to No. 44 (B.) Sqn., Waddington, 29.4.38. F. B. Bristow, to H.Q., R.A.F., Iraq, Habbaniya, 25.4.38. L. E. Dowse, to R.A.F. Station, Upper Heyford, 19.4.38. G. F. Humphries, to H.Q., No. 4 (B.) Group, Linton-upon-Ouse, 28.4.38. C. G. Lott, G. C. Tomlinson, to No. 1 A.A.C. Unit, South Farnborough, 2.5.38.



Some aspects of the new Short Sunderland flying boat: the unusual hull bottom and the nose and tail gun turrets.

SPARKING PLUGS in AERO ENGINES

Point-erosion Problems Raised by Modern Screening Systems : How They Are Being Tackled

By F. R. F. RAMSAY

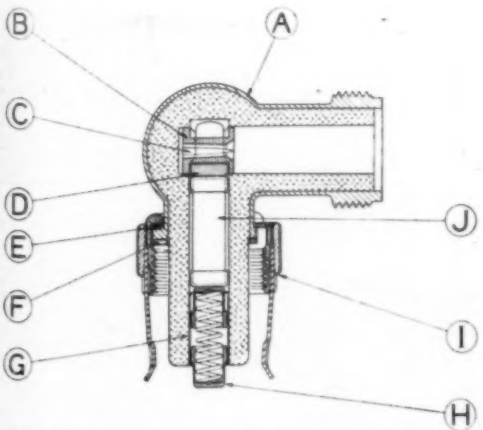
THE problem of point erosion of sparking plugs is as old as sparking plugs themselves. In the course of time much has been learned and applied in design and, as a result, the plugs of the ordinary motor car are relegated to the "forgotten" parts of the mechanism. But recent rapid advances in aero engine design have brought plug-point erosion back to the forefront among the urgent problems to be solved.

The trend towards an increase in the number of cylinders to obtain higher unit power, compact engines and the universal use of complete ignition screening, make it all the more urgent that every effort should be made to put the plugs back to their former state of inoffensive obscurity.

Higher speed and temperature are obvious causes for this increase in point erosion. Another less obvious, but no less potent, reason is the much larger capacity connected in parallel with the points, through the use of screened cable or screening harness. The reason for this is not immediately obvious, but a little consideration of the nature of a spark will make it clear.

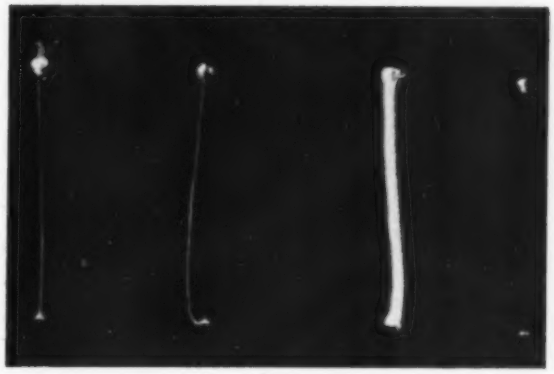
Vaporisation and erosion of the metal of the points are not essential for the passage of an electric discharge through a gas. Erosion occurs because the high concentration of energy in sparks on a very small area of the surface of the metal melts and vaporises the metal at that point at the instant the spark passes. If the discharge could be passed across the gap in a steady stream much less erosion would take place; although the discharge would still be concentrated on a small area, the maximum rate of discharge would be greatly reduced. The tail of the spark does, actually, more or less follow this style of discharge, but the first part, which is usually identified as the spark itself, does not.

It is interesting, and will assist comprehension of the matter, to analyse the nature of the spark. The gas between the points is normally an almost perfect insulator, until a high voltage is applied to it. Then, at a certain point, it suddenly changes its character, becomes ionised, and allows a current to pass. The passage of the current enormously increases the ionisation and the gap suddenly becomes quite a good conductor, with a resistance of the order of ten to a hundred ohms. As the applied voltage is some thousands of volts, an enormous surge of current takes place and the rate of discharge of energy may be as high as a hundred kilowatts. This only lasts for a few millionths of a second (there would be no plug left if it lasted much longer!) and is followed by the tail of the spark. This consists of the remainder of the energy available, which may be as much or more than was used in the spark,



A high-tension contact assembly with 1,000-ohm resistor—the K.L.G. BR90 elbow. The parts are :

A. Steel shell.
B. Cable nipple.
C. Cable securing needle.
D. Locking stirrup.
E. Interlocking washer.
F. Seating washer.
G. Contact housing.
H. Spring loaded contact
I. Cable nut with "clicker" spring.
J. Resistor (1,000 ohms value).



The effect of various types of cable connection : A single spark from (left to right) plain rubber insulated cable ; 8ft. 6in. shielded cable with 1,000-ohm resistor ; 8ft. 6in. shielded cable without resistor ; 8ft. 6in. shielded cable with 10,000-ohm resistor.

discharging through the low resistance of the gap, but limited by the high resistance of the magneto winding, through which the current must pass. The rate of discharge is now only a few watts.

The reason for the very high rate of discharge of the spark is that in this case the current does not pass through the magneto winding, but is stored before ionisation in the capacity in parallel with the plug, and is limited only by the gap resistance and the resistance of the cable, which is very small. The amount of energy which can be stored in this capacity is proportional to the size of the capacity and, incidentally, the square of the voltage needed to break down the gap. When this energy is exhausted the spark ceases and the tail commences. Both spark and tail are arc discharges of the same nature but at greatly different rates and duration, the condition being determined by the effective resistance in circuit.

What Screening Does

In normal circumstances, using ordinary rubber-insulated, unscreened, high-tension cable, the capacity directly in parallel with the plug is quite small, and relatively little energy goes into the first surge of current. Most of the point-burning in this case can be attributed to the tail of the discharge and, since this is a low-rate discharge, erosion is slow. Screening the cable increases the capacity as much as five times, with a corresponding increase in the energy of the spark surge. The effect may be seen plainly by comparing a spark through plain cable with the same spark through several feet of screened cable. In the first case a thin blue spark with a yellowish halo is seen, while the spark through screened cable is bright and noisy. If the spark gap is made to rotate rapidly the halo is seen to spread out in the form of a long tail which is shorter when screened cable is used owing to the fact that more energy is taken for the spark and there is, therefore, less for the tail. Careful scrutiny of the bright spark will reveal that particles of burning metal are exploding out of the points. Tests show that the rate of point-burning increases two or three times, depending on the length of cable, when screened cable is used.

It is common knowledge that a resistor connected between the plug and the cable increases the life of the gap, and the "suppressors" used on cars fitted with wireless sets fulfil this purpose incidentally to their real purpose of suppressing the oscillation which causes radio interference. These suppressor resistances are of a value of ten to twenty thousand ohms, which is vastly greater than is necessary to slow the rate of the capacity spark, but which is necessary to suppress oscillation. The capacity spark with the plain cable is small in any case, and the real reason for the decrease in point-burning in this case is the reduction in total energy of the spark, since the suppressor resistance is several times that of the magneto, or coil winding.

Following this precedent, many experiments were made with resistors on aero engine plugs with the object of reducing the erosion due to the use of screened cable. The true course of the phenomenon was not realised and it was generally thought that it would be necessary to suppress oscillation and reduce the energy of the spark in order to eliminate the increased

erosion caused by the additional capacity of the screened cable. On this account high resistances of the same value as suppressor resistances were used, but, although these were successful in their object, certain effects peculiar to aero engines made them impracticable. The heavy fouling of the plug insulators, caused by the leaded fuel used and the high temperature, made it undesirable to reduce the spark energy below that necessary to cope with the electrical leakage caused by the fouling. A certain minimum of spark energy is also necessary to burn the deposit off the points, as otherwise the gap slowly closes up and short-circuits the plug. In addition, it was no easy matter to design a resistor of reasonable dimensions able to cope with the high voltage which appeared across it and the other arduous conditions of use. These results led to the abandonment of the attempt, until the writer's researches into spark phenomena led him to try the effect of reducing the rate of the capacity discharge, without affecting the total energy of the spark or attempting to suppress oscillation (oscillation has not been included in the above explanation of spark discharge as it does not affect the conclusions reached; both high- and low-frequency oscillations exist in a spark discharge).

Judging from the average resistance of the ionised gap, the additional resistance necessary to produce a considerable reduction in the rate of discharge would be much less than ten thousand ohms and, in fact, it was found that a resistance of one thousand ohms cancelled out completely the effect of the screening and reduced the point erosion to the same rate as was given by plain cables. There was no measurable reduction in the total spark energy, and prolonged engine tests showed no tendency to "building-up" of the gap. The optimum value of resistance would vary slightly with cable capacity and plug voltage, but there is no gain in reducing it below one thousand ohms, and increasing it would tend towards the dangerous region without any useful increase in efficiency.

The voltage across the resistor being much lower than with the suppressor type, it became an easy matter to incorporate it in the screened cable elbow terminals, this method being preferred to that of building it into the plug, and terminals of this type are about to be put into production by K.L.G. Sparking Plugs, Ltd., who have acquired the patent covering this work.

The real value of the reduction in point erosion lies not in the saving in cost through increase in plug life, though this is worth having, but in the extension of time between removal of the plugs for servicing and the increased reliability in flight.

The research on the problems referred to above was carried out in the laboratories of D. Napier and Son, Ltd., Acton, in collaboration with K.L.G. Sparking Plugs, Ltd. The writer's thanks are due to the former company for permission to publish the results.

AIR MINISTER at R.A.F. F.C. DINNER

First Public Appearance

WHEN 70-odd R.A.F. officers get together on an auspicious occasion, as they did for the R.A.F. Flying Club's fifth annual dinner last Friday, an excellent spirit of camaraderie and at least a modicum of revelry may be taken for granted. But when the same very delightful and informal spirit continues to pervade the party in the distinguished presence of a new Secretary of State for Air making his first public appearance since his appointment, it speaks very highly for the personality and understanding of that Minister.

Sir Kingsley Wood had consented to attend at only a few hours' notice on a busy day, and everyone felt his presence a personal honour; F/O. W. A. Hammerton (the chairman), Flt. Lt. Robert Brittain (the club's founder), Sir Harry Brittain and Mr. Handley Page each expressed that feeling.

There were no official speeches, but if more speakers at dinners were to model their efforts on the brilliantly witty sentiments of those who addressed the company the jokes about postprandial oratory would soon become meaningless.

F/O. W. A. Hammerton said a few words about the club, its three aeroplanes stationed at Hatfield and its past year, and thanked the officials, in particular F/O. R. G. Weighill, the hon secretary. Then Flt. Lt. Robert Brittain, who founded the club before going out East, spoke of its growth. He was pleased to see that the office was "No longer a suitcase under his bed," and mentioned the Egyptian Branch, which is in the able hands of Flt. Lt. J. N. Tomes, at the moment on leave and present at the dinner.

Sir Harry Brittain thought it splendid to have the Secretary of State present, and took the opportunity of mentioning his past achievements in popularising the Post Office and vitalising the Ministry of Health.

Sir Kingsley Wood himself was persuaded to say a word or two. He recalled a vote of thanks in which he had been described as no ornament to the House of Commons, but, nevertheless, a good hard-working member. He was content to be described thus. Sir Kingsley expressed his pleasure at his reception there. He also added, in answer to a possible hint from a previous speaker, that Mr. Handley Page was much better able to meet the Club's demand for more machines than was the Secretary of State, who was limited by the Chancellor of the Exchequer.

Mr. Handley Page said that Sir Kingsley's nicely rounded frame offered very little resistance to his forward political progress, and suggested that it was the true type of angelic fuselage. There were, of course, two kinds of angels. He did not think there were black angels in the S.B.A.C., though perhaps they were not white—possibly they were camouflaged. It was a great compliment to be a guest and good to hear Sir Kingsley talking thus familiarly down from the pedestals of the great.

Concluding, Mr. Handley Page said that were his products more suitable for the R.A.F.F.C., and not so much needed by the Secretary of State, he would be only too delighted to let them have some (cries of "Why not?")—to give them "some of certain type equalled by few and bettered by none, and equipped with a certain device."

Napier Appointment

IT is announced that Mr. C. W. Reeve, chairman and managing director of the Associated Equipment Co., Ltd., has been elected a director of D. Napier and Son, Ltd.

Mr. T. B. Keep

MR. T. B KEEP, M.I.Mech.E., M.I.A.E., managing director of Petters, Ltd., of Yeovil, has accepted an additional appointment—that of managing director of the Brush Electrical Engineering Co., Ltd., Loughborough.

Deekay Changes

THE Deekay Aircraft Corporation Ltd., announce that Major E. L. Gower, A.F.C., has joined the Board, while the company's address has been changed to 39-40, Albemarle Street, London, W.1.

Models

OWING to pressure on space, caused by the coincidence of several important events, we are compelled to hold over the monthly "Models" page until next week.

NEW COMPANIES

AIR COURIERS LTD.—Private company, registered May 20. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of aircraft engineers, consultants, contractors and suppliers, and carriers of passengers and goods by air. The directors are: Wm. F. Griffith and Geo. G. Glanville. Registered office: Croydon Aerodrome, Croydon.

LONDON SAILPLANES LTD.—Private company, registered May 24. Capital, £100 in 100 shares of £1 each. Objects: To promote and encourage gliding, soaring and aviation in all its forms, etc. Subscribers: Henry A. Petre and Edward A. Storey Barnard. The directors of the company shall be members of the Committee of the London Gliding Club. Solicitors: Blount Petre & Co. 8, Carlos Place, Grosvenor Square, London, W.1.

BRUCE DOUGLAS MOTORS (BRISTOL) LTD.—Private company, registered May 21. Capital, £10,000 in 10,000 shares of £1 each. Objects: To carry on business as mechanical, aeronautical, motor, electrical and general engineers, etc. The directors are: Bruce Douglas and Jack Douglas. Solicitors: Cooke, Painter Spofforth and Co., 28, Broad Street, Bristol.

SOUTHERN MOTORS AND AIRCRAFT (CROYDON) LTD.—Private company, registered May 25. Capital, £100 in 100 shares of £1 each. Objects: To carry on business as aeronautical experts and consultants, dealers in aeroplanes, airships, motors, cycles and vehicles generally. The subscribers are: Donald E. Middleton and Doris E. Davies. D. E. Middleton signs documents as director. Solicitors: Good, Good and Co., Fairfax House, Fulwood Place, London, W.C.1.

AEROPATENTS LTD.—Private company, registered May 18. Capital, £100 in 100 shares of £1 each. Objects: To carry on the business of aeronautical, mechanical, constructional, railway, electrical and motor engineers. The first directors are: Louis S. Armandias (permanent) and Spence Sanders. Solicitors: F. R. Stephen and Co., 34, Bishopsgate, London, E.C.2.